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**THE DETERMINATION
OF
RICE PRICES IN BANGLADESH:
SUPPLY SHOCKS, TRADE LIBERALIZATION
AND
CROSS-BORDER TRADE**

PAUL A. DOROSH

MARCH 1999

FMRSP Working Paper No. 2

FMRSP Bangladesh
Food Management & Research Support Project
Ministry of Food, Government of the People's Republic of Bangladesh

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This work was funded by the United States Agency for International Development (USAID)

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* Chief of Party, FMRSP, and Research Fellow, IFPRI

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EXECUTIVE SUMMARY

The liberalization of external trade in foodgrains in the early 1990's brought about a major structural change in the determination of foodgrain prices in Bangladesh. Prior to the liberalization of rice trade in April, 1994, domestic prices of rice were essentially independent of prices in the rest of the world. Domestic supply, (consisting of domestic production and net government market injections), and domestic demand, (a function of incomes, consumer preferences and government transfer programs), determined market prices in Bangladesh; world prices affected the Bangladesh market only through their influence on government food policy. Since the legalization of private import trade, however, the import parity price (ex: India) has acted as a ceiling on domestic prices, and in several years, private sector imports have served to balance market supply and demand.

Chapter 3 of this report shows that since liberalization of private sector rice imports, there have been two periods (December, 1994 to April, 1996 and December, 1997 through early 1999) of large-scale private sector imports (mainly from India). These periods co-incident with a series of sub-par rice harvests that led to an increase in domestic prices up to import parity levels. Letters of credit data from these two periods indicate a broad participation in the rice import trade and only a small share of the largest suppliers. Thus, it appears that there was little scope for a small group of traders to significantly affect market supply and prices.

As shown in Chapter 4, Bangladesh imports from India have likely had little effect on India's market price, particularly during the kharif (aman) season, when India's rice production (about 70 million MTs) is nearly eight times larger than that of Bangladesh (about 9 million MTs). During the rabi season (corresponding to the boro and aus harvests in Bangladesh), however, India's rice production is only slightly more than for Bangladesh (9.4 and 7.3 million MTs, respectively in 1996/97). Foodgrain Corporation of India (FCI) procurement and sales at fixed prices have helped to stabilize India's market prices, but FCI stocks rose substantially in the mid-1990s to 35.6 million MTs in

July 1995 after both procurement and release prices were raised. Wheat and rice stocks remain in excess of target levels, while excessive stocks and subsidized distribution have resulted in large fiscal costs. Liberalization of private sector rice and wheat export trade took place in India only in 1994, shortly after trade liberalization in Bangladesh.

In chapter 5, partial equilibrium analysis of the rice market in Bangladesh is used to model the flow of private sector imports from India under alternative estimates of production, private stock changes and parameter values. The model results suggest that the aman shortfall was even greater than given in official estimates, given the large amount of private sector imports and the rise in rice prices. The analysis also shows that per capita consumption of rice fell by 2.4 to 4.6 percent following the aman shortfall. Finally, private rice imports from January to April 1998 were about four times greater than net government market injections, suggesting that they were the dominant factor in stabilizing domestic market supply and prices after the 1997/98 aman shortfall.

The main message of this paper is that food policy in Bangladesh should take into account of the potential impacts of India's policies and cross-border trade. Thus, more effort should be made in monitoring India's food policy, production forecasts, and current market conditions. Timely collection of information published by the Government of India, analysis of letters of credit for rice trade and data on actual official trade flows, and monitoring of market flows and prices at major cross-border trade points should be done on a more regular basis. Further research is also needed to more fully explore the important linkages between the foodgrain markets of India and Bangladesh.

Finally, the government's role in encouraging large-scale rice imports by the private sector in early 1998 emphasizes the importance of a transparent food policy in stabilizing foodgrain markets. The Bangladesh government provided clear signals to the private markets by reducing the import surcharge on rice; it also maintained incentives for private sector rice imports by limiting OMS subsidized sales and by not interfering with private sector trade. These policies were instrumental in the successful management of

the 1997/98 aman shortfall and the 1998 flood. Maintaining a transparent and consistent food policy in this way can thus add to Bangladesh food security, as well as reduce fiscal costs to the government.

1. INTRODUCTION

The liberalization of external trade in foodgrains in the early 1990's brought about a major structural change in the determination of foodgrain prices in Bangladesh. Prior to the liberalization of rice trade in April, 1994, domestic prices of rice were essentially independent of prices in the rest of the world. Domestic supply, (consisting of domestic production and net government market injections), and domestic demand, (a function of incomes, consumer preferences and government transfer programs), determined market prices in Bangladesh; world prices affected the Bangladesh market only through their influence on government food policy. Since the legalization of private import trade, however, the import parity price has acted as a ceiling on domestic prices, and in several years, private sector imports have served to balance market supply and demand.

Government procurement and market injections still have a role in price determination in years when market prices are below import parity. Moreover, these factors also influence the level of private sector imports when prices are at import parity. In years of good harvests, there has been little incentive for private imports of rice as domestic supply and demand have balanced at a price below import parity. Yet, several times since the liberalization of rice trade in 1994, poor rice harvests resulted in a sharp rise in domestic prices to import parity levels and substantial private sector rice imports. The objective of this paper is to analyze recent movements of Bangladesh market prices of rice and imports, examining both domestic factors and the role of international trade, especially trade with India.

PRICE DETERMINATION IN AN OPEN ECONOMY

The major distinction between price determination of rice with and without free trade can be illustrated in general terms using a basic diagram of market supply and demand (Figure 1.1). In the absence of free trade, the market price of foodgrain is

determined by domestic supply and demand (Figure 1.1a). Domestic supply consists of domestic production plus government direct distribution and sales. Domestic demand is equal to private consumer demand plus government purchases and changes in private stocks. The government thus affects the market price of foodgrain through its net purchases or sales (domestic procurement less sales and direct distribution). In such a closed economy, the Ministry of Food thus can potentially raise producer prices in the open market through domestic procurement, or lower market prices for consumers by raising market supplies (shifting the supply curve from S_0 to S_1) through distribution of imports or stocks.

In an open economy, with legalized private trade, if domestic demand exceeds domestic supply at the price at which imports are profitable for the private sector, private imports meet the gap between domestic supply and demand. The domestic price will thus equal the import parity price, i.e. the export price in the country of origin plus shipping, handling and marketing costs to bring the commodity to the domestic market.¹

As shown in Figure 1.1b, with an import parity price of P_m , domestic demand, D_1 , exceeds domestic supply (S_1) by M_1 , the quantity of imports.

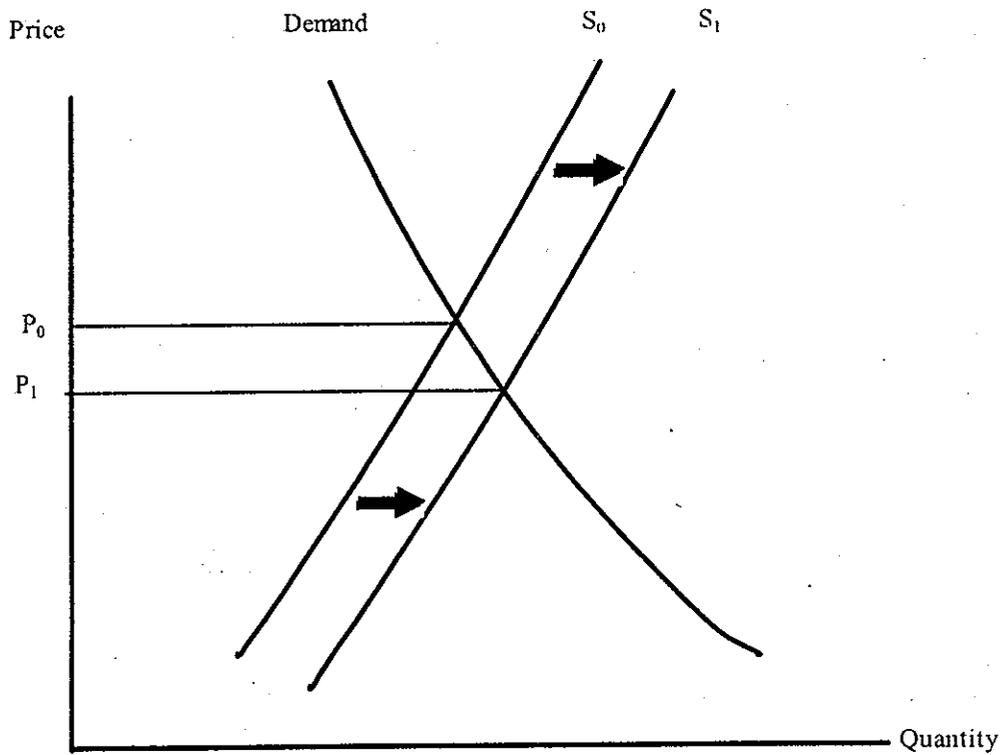
Figure 1.2 illustrates the impacts of government market interventions under the closed economy and free trade scenarios. As shown in Figure 1.2a, in a closed economy, an increase in total demand through an increase in domestic procurement, shifts the demand curve from D_0 to D_1 , raising the domestic price from P_0 to P_1 . By contrast, in the open economy shown in Figure 1.2b, an increase in domestic procurement that shifts the demand curve from D_0 to D_1 , has no effect on the domestic price, which remains at import parity (P_m). Rather, imports increase from M_0 to M_1 .

¹ Similarly, if domestic supply exceeds domestic demand at the price at which exports are profitable for the private sector, private sector exports will occur. Here, the export parity price is defined as the price at which the commodity can be sold in the importing country less the costs of shipping, handling and marketing. For Bangladesh in recent years, however, supply has not exceeded demand at export parity prices, i.e. there has been no exportable surplus.

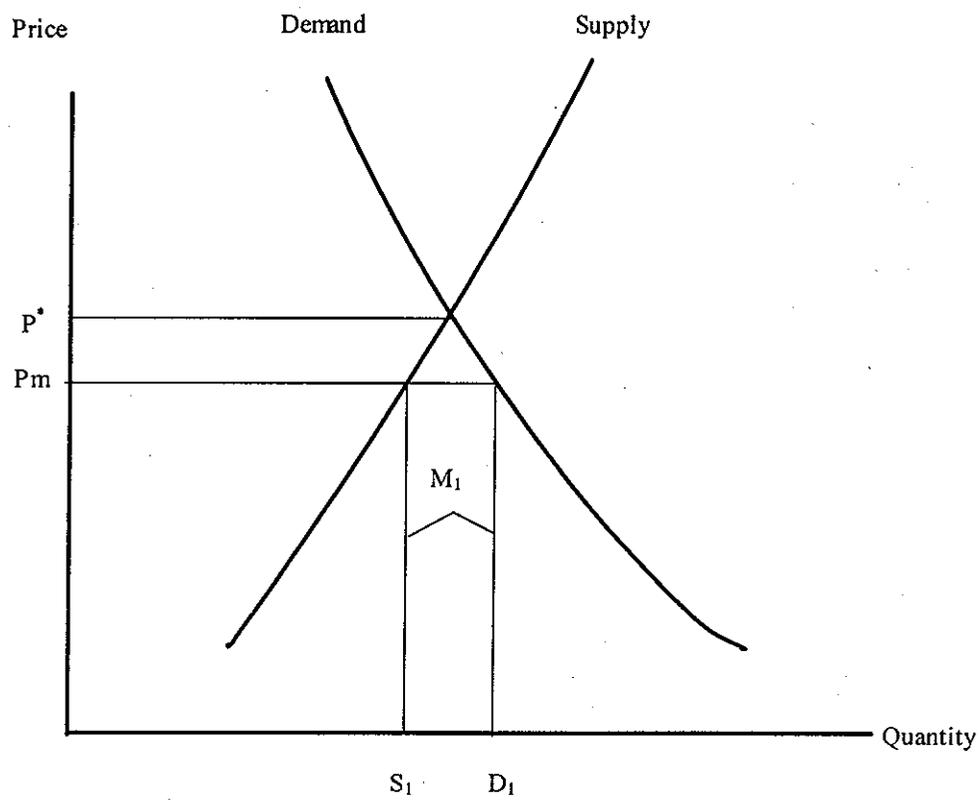
The above analysis assumes a single integrated market with a single price for the commodity. Transport and marketing margins between regions of the country may result in differences between producing and consuming regions. Thus, small amounts of trade may take place in border regions even when the average price differential at a national level is insufficient to lead to substantial flows of grain from one country to another. Moreover, prices vary over time within a season largely due to storage costs and changes in expectations of future price movements. Nonetheless, though the above figures abstract from variations in prices within a country or over time, they capture the essence of the determinants of price determination and trade flows.

PLAN OF THE PAPER

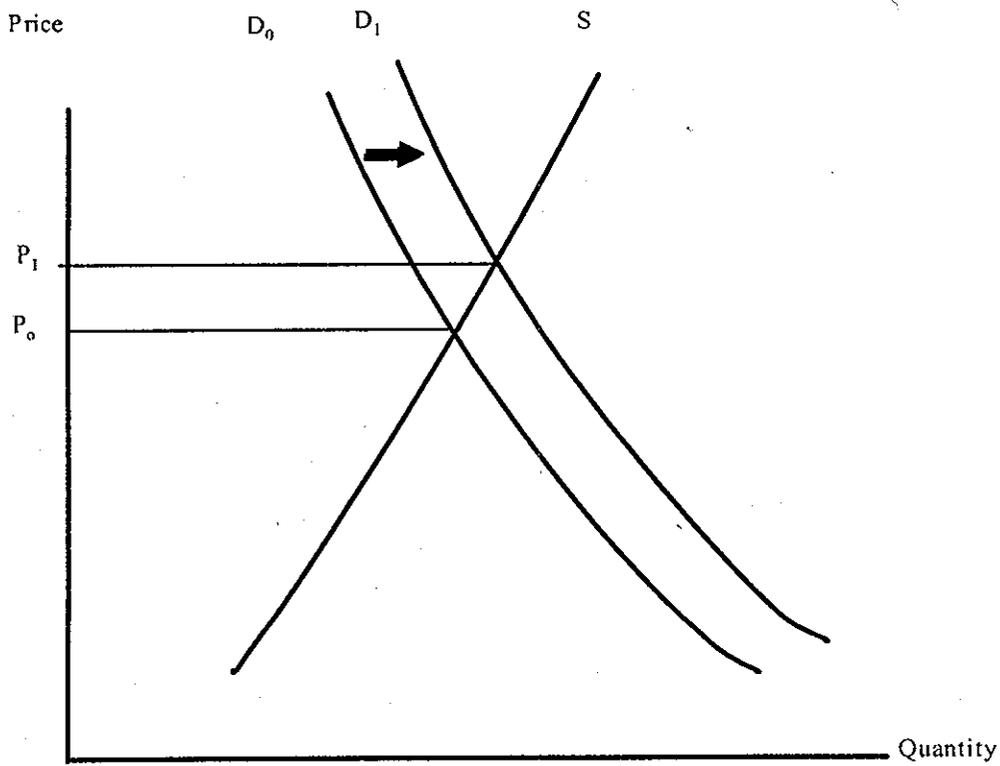
The rest of this paper examines the determination of rice prices in Bangladesh in more detail. Chapter 2 focuses on the role of a shift in demand as a possible factor explaining price trends in Bangladesh. The impacts of grain trade liberalization in Bangladesh are discussed in Chapter 3. Given the important role of trade with India for Bangladesh prices and market supply, chapter 4 focuses on the structure of India's foodgrain markets and recent Indian government policy. Chapter 5 presents a partial equilibrium model of the rice market in Bangladesh. The model is then used to analyze the effects of the 1997/98 aman shortfall on market prices and private sector imports. Chapter 6 contains a brief summary and conclusions.

Figure 1.1 (a) — Price Determination in a Closed Economy (Without Free Trade)

Source : Author

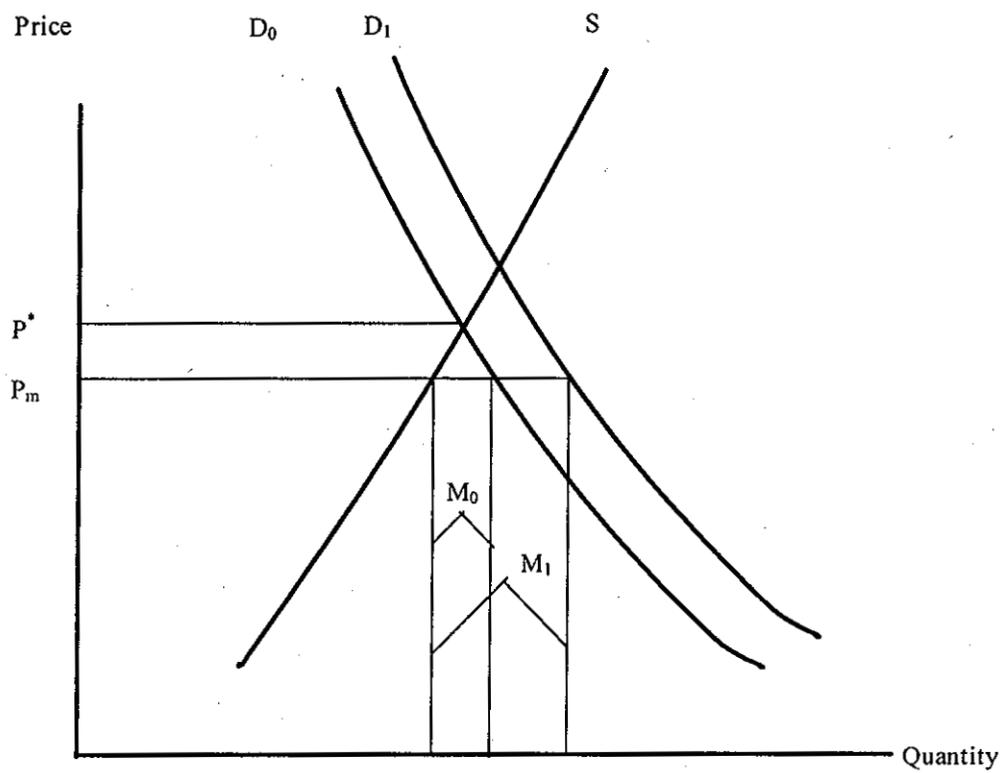
Figure 1.1 (b) — Price Determination in an Open Economy (With Free Trade)

Source: Author

Figure 1.2 (a) — Impacts of an Increase in Demand in a Closed Economy

Source : Author

Figure 1.2 (b) — Impacts of an Increase in Demand in an Open Economy



Source : Author

2. RICE DEMAND AND REAL PRICE TRENDS

Rice production and net rice availability in Bangladesh increased substantially from the late 1970s to the early 1990s (Table 2.1), largely due to expansion in boro rice production related to adoption of high yielding varieties (HYV's), increased fertilizer use, and expansion of irrigated area. Since the early 1990s, there has been no consistent trend in production or availability, as unfavorable weather and problems with input supplies have caused several poor rice harvests (Figure 2.1).

Nonetheless, real prices of rice in Bangladesh declined considerably from the mid-1970s to the late 1990's (Figure 2.2). Using the Dhaka middle-income consumer price index (CPI) as a deflator, a measure of overall inflation, the decline in real rice prices between 1977-79 and 1996-98 is 34 percent. Using only the non-food component of the CPI as a deflator, the decline in real prices of rice relative to the average price of non-food consumer goods is 43 percent.² Over the same period, per capita food consumption (proxied by per capita net availability) actually fell by 1.6 percent, from 137.6 to 135.4 kgs/capita/year, after having risen to 145.4 kgs/capita/year in 1991-93.

Estimates of national consumption of foodgrain over time are somewhat uncertain as estimates of net food availability have been consistently below consumption figures derived from the national Household Expenditure Survey (HES). As shown in Table 2.2 and Figure 2.3, there has been a steady decline in the ratio of rice availability to HES rice consumption, from 1.10 to 0.82. Beginning with the 1985/86 survey, net foodgrain

² The above calculations are based on a December to January marketing year, since the aman rice harvest occurs in November-December.

Table 2.1 — Rice Production, Availability and Prices, 1977-98

Year	Mid-Year Population (Million)	Rice Production ('000 MT)	Rice Procurement ('000 MT)	PFDS Distribution ('000 MT)	Private Imports ('000 MT)	Rice Availability ('000 MT)	Availability Per Capita (kg/Person)	Real Price Course Rice National Ave. (June - July) (1997 Tk./ Kg)	Real Price Course Rice National Ave. (Dec - Nov) (1997 Tk./ Kg)
1976/77	81.8	11,753	317	750	-	11,011	134.6	18.0	16.9
1977/78	83.7	12,969	548	600	-	11,724	140.1	20.6	16.4
1978/79	85.6	12,849	306	570	-	11,828	138.2	16.8	16.4
1979/80	87.7	12,740	228	695	-	11,934	136.1	24.6	19.1
1980/81	89.9	13,880	841	514	-	12,165	135.3	16.0	14.5
1981/82	91.9	13,629	290	772	-	12,748	138.7	14.5	16.0
1982/83	93.9	14,215	168	496	-	13,121	139.7	16.7	16.0
1983/84	96.0	14,509	145	503	-	13,416	139.7	16.1	16.4
1984/85	98.1	14,623	133	399	-	13,426	136.9	18.2	17.8
1985/86	100.3	15,038	219	372	-	13,687	136.5	14.5	13.9
1986/87	102.5	15,406	137	495	-	14,223	138.8	15.3	14.2
1987/88	104.7	15,413	288	468	-	14,052	134.2	15.4	14.5
1988/89	106.8	15,544	364	690	-	14,316	134.0	14.2	14.4
1989/90	108.9	17,856	918	675	-	15,827	145.3	13.0	13.5
1990/91	111.0	17,852	727	971	-	16,311	146.9	12.8	12.3
1991/92	113.0	18,252	939	759	-	16,246	143.8	13.3	12.7
1992/93	115.0	18,341	233	476	-	16,750	145.7	12.9	9.8
1993/94	117.0	18,041	148	350	74	16,512	141.1	9.1	10.3
1994/95	119.0	16,833	246	329	583	15,816	132.9	12.4	13.2
1995/96	121.0	17,687	353	593	650	16,808	138.9	13.7	12.5
1996/97	123.0	18,753	513	739	15	17,119	139.2	11.4	9.4
1997/98	125.0	18,854	399	529	1,007	18,106	144.7	9.5	11.0

Note: Rice prices are deflated with the Dhaka middle income consumer price index.

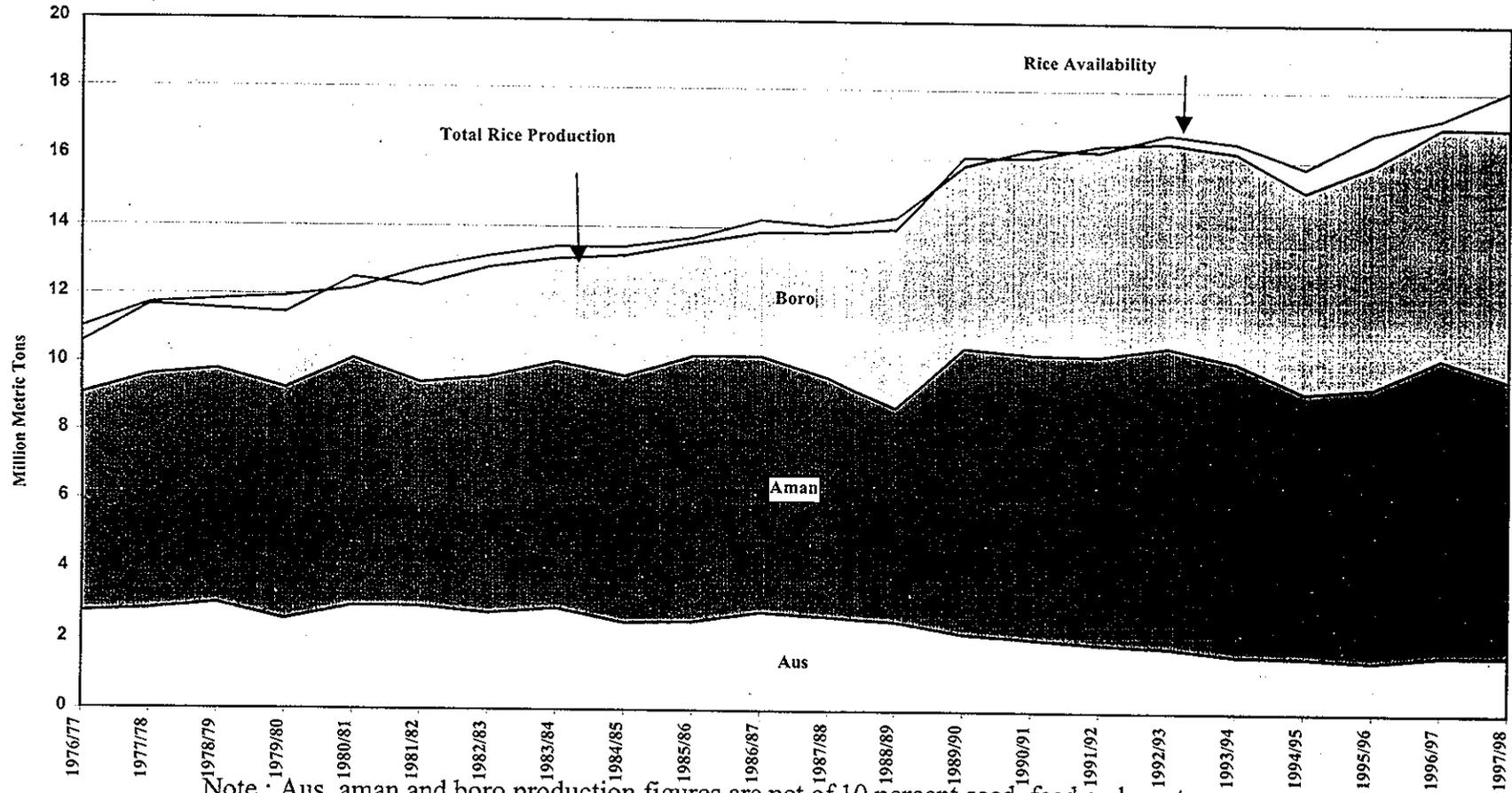
Source: Bangladesh Bureau of Statistics, FPMU, and author's calculations

Table 2.2 — Consumption of Rice and Wheat and Net Availability in Bangladesh, 1974-96

	(gms/day/person)							
	1973/74	1976/77	1981/82	1983/84	1985/86	1988/89	1991/92	1995/96
Rice								
Availability/Cap	386.3	353.8	380.0	382.9	373.9	367.2	393.9	380.6
Consumption as measured by HES								
Rural	354.0	329.3	404.0	420.0	453.7	449.0	482.0	479.0
Urban	286.3	326.3	363.0	350.4	376.3	395.1	416.0	390.3
National	347.9	329.0	398.1	411.6	443.9	441.7	472.8	464.3
Availability/ HES Consumption	1.11	1.08	0.95	0.93	0.84	0.83	0.83	0.82
Wheat								
Availability/Cap	62.2	46.2	64.2	71.8	54.0	80.0	59.8	58.1
Consumption as measured by HES								
Rural	84.7	48.8	54.4	62.8	51.3	58.8	34.6	32.4
Urban	155.1	77.5	85.2	74.0	54.3	53.1	47.1	40.1
National	91.0	51.5	58.7	64.1	51.7	58.1	36.3	33.7
Availability/ HES Consumption	1.46	1.12	1.09	1.12	1.04	1.38	1.65	1.72
Total Foodgrain								
Availability/Cap	448.5	400.0	444.2	454.7	427.9	447.2	453.7	438.7
Consumption as measured by HES								
Rural	438.6	378.1	458.4	482.8	505.0	507.8	516.6	511.4
Urban	441.4	403.8	448.2	424.4	430.6	448.2	463.1	430.4
National	438.9	380.5	456.8	475.7	495.6	499.8	509.1	498.0
Availability/ HES Consumption	1.02	1.05	0.97	0.96	0.86	0.89	0.89	0.88

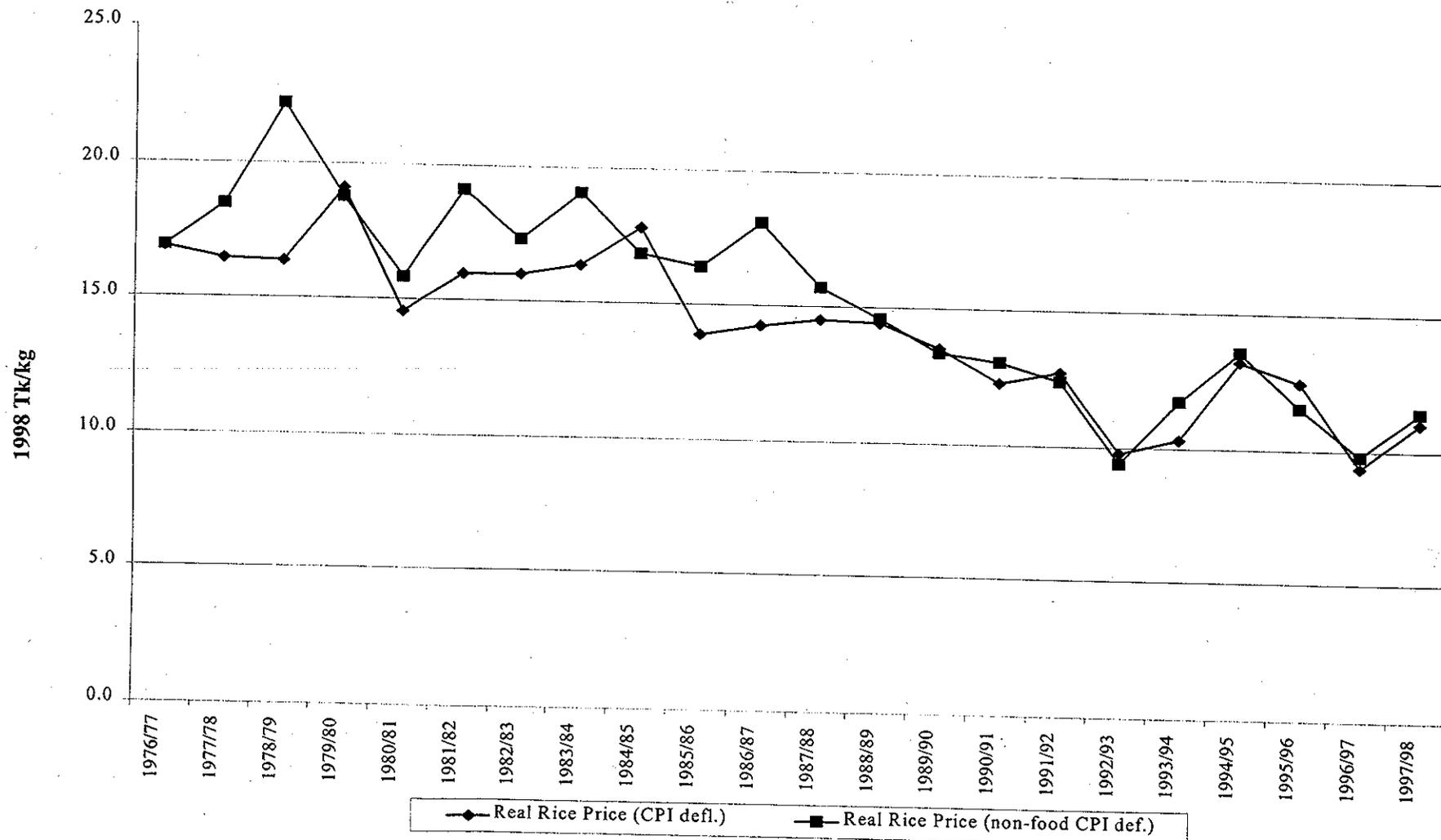
Source : Household Consumption from Household Expenditure Survey (HES) of Bangladesh Bureau of Statistics and Availability data from FPMU of MOF and A Data Base on Agriculture and Foodgrains in Bangladesh(1947-48 to 1989-90), Hamid.

Figure 2.1— Total Rice Production and Availability in Bangladesh



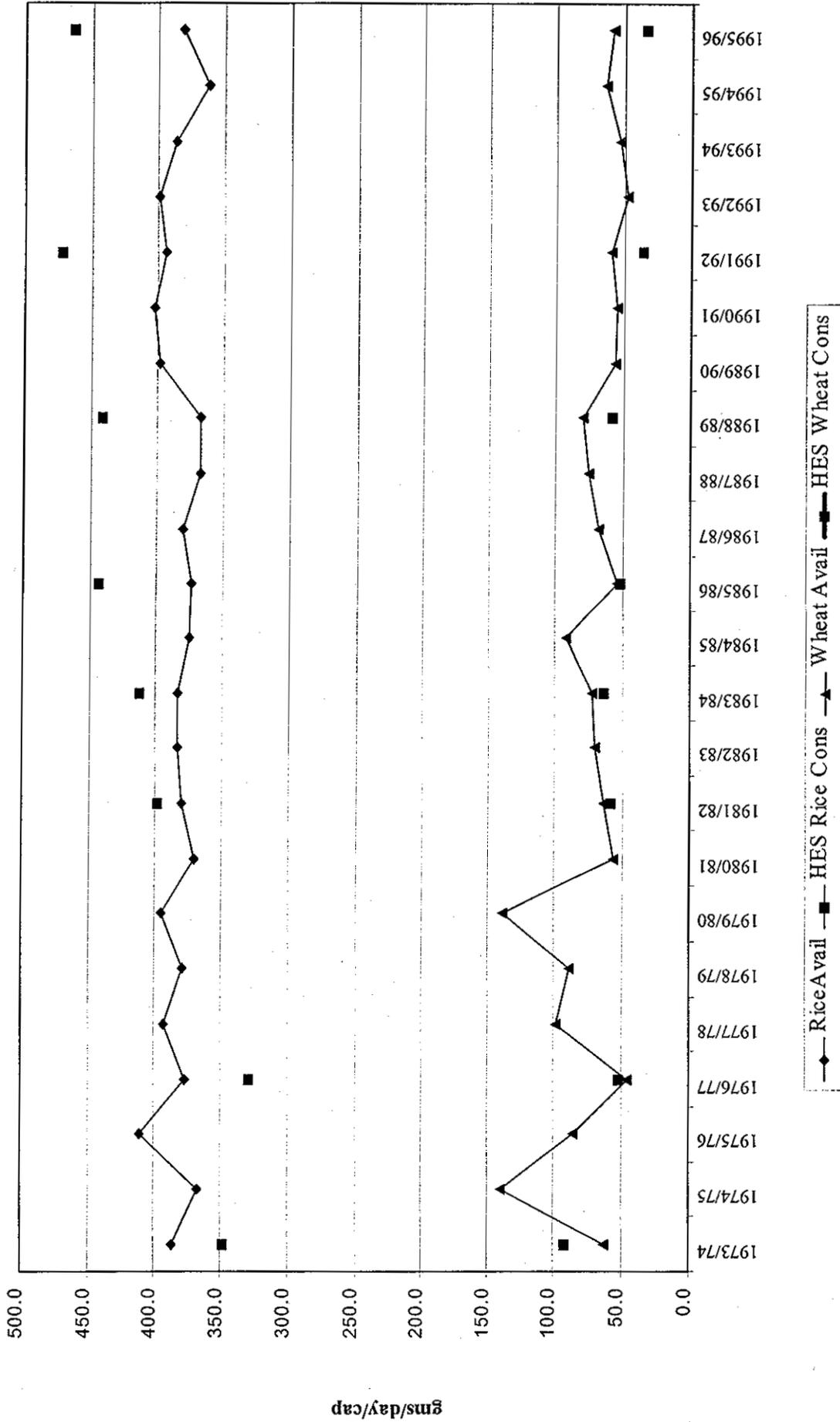
Note : Aus, aman and boro production figures are net of 10 percent seed, feed and wastage.
 Source : FPMU, MOF.

Figure 2.2 — Real Prices of Coarse Rice, 1977-98 (December - November Marketing Year)



Source: DAM; BBS; author's calculations.

Figure 2.3 — Net Availability and HES Consumption Estimates of Rice and Wheat in Bangladesh, 1974-96



availability estimates have been only 82 to 84 percent of HES rice consumption figures.³

Assuming that the HES figures are indeed more accurate, the lower rice availability per capita figures must be due to a combination of under reporting of production and/or imports and over-estimates of losses and other end uses.⁴ Mitchell (1998), suggests that the sampling frame used for crop cuttings gives insufficient weight to irrigated land that normally has higher yields, so that average rice yields are underestimated.⁵ In most years, unrecorded cross-border trade is likely to have been small given a lack of price incentives for significant rice movements (Rahman et. al., 1994). In recent years when substantial official cross border flows occurred, however, it is likely that informal imports were also significant (e.g. 1997/98, see Shahabuddin and Dorosh, 1999).

Econometric analysis sheds some light on the relationship between real market prices and consumption. Economic theory suggests that the demand for rice is a function of the price of rice (Price), prices of other commodities (Pother), household incomes (Yh), and other household characteristics, such as location, i.e. urban or rural:

$$Q_d = f(\text{Price, Pother, Yh, household characteristics})$$

Following Ahmed and Bernard (1989) and Shahabuddin (1992), we include a dummy variable (DIST DUM), that equals 1 for years in which rice was distributed through ration channels (i.e. prior to 1992/93). In the regressions, all quantity variables in per capita terms and the rice price are deflated by the Dhaka middle-income CPI. Real incomes are

³ The increase in household consumption in the early 1980s reported in the HES may be in part due to a change in data collection methods from simple recall to the use of household diaries to record consumption. See xx for a discussion of HES survey data methods.

⁴ With an increase in incomes over time, it is possible that wastage of rice by households has also increased (personal communication, Forest Cookson).

⁵ The irrigation census of 1996 shows irrigated area to be 56 percent of rice area, but BBS shows it to be only about 30 percent (Mitchell, 1998). However, it is possible that differences in definitions or measurement errors account for some of the discrepancy between these two figures.

proxied by real GDP/capita. All variables, apart from the time trend and distribution dummy, are in natural logarithm terms.⁶

Results of the regressions are given in Table 2.3. With all variables included except a time trend, the own-price elasticity of demand for rice is -0.13 , but the coefficients on the rationed rice distribution dummy and real per capita income are not significant. In particular, the income elasticity of demand (the coefficient on the logarithm of real per capita income) is only 0.02 , and not significantly different from zero, suggesting that changes in real income have little effect on national rice consumption.

Including a time trend in the regression results has essentially no effect on the other regression coefficients, but apart from the coefficient on real price, no other coefficients are significantly different from zero (equation 2). Dropping the distribution dummy from the regression, however, reduces the own price elasticity of demand to -0.11 , but none of the coefficients are significant except the constant (equation 3). In general, the regression fits more recent data (from the mid-1980s to 1990s) better than data from the 1970s and early 1980s. Extending the sample size to include data from the 1970s has little effect on the regression (equation 5). However, reducing the sample to 1983-98 improves the fit of the regression slightly and results in an own-price elasticity of demand of -0.15 .

Table 2.4 presents other estimates of price and income elasticities in Bangladesh. Most of these estimates derive from cross-section data, in particular, econometric estimates of household expenditure data from the various rounds of the Household Economic Survey (HES). Cross-section estimates of the own-price elasticity of demand for rice vary from -0.12 (Ahmed and Shams, 1993) to -0.96 (Bouis, 1989). The most recent estimates using HES data (Goletti, 1993 and Shahabuddin and Zohir, 1995)

⁶ Other commodity prices are not included in the regression because no other single commodity has a large budget share in comparison with rice.

provide very similar estimates for urban price elasticities (-0.59 and -0.65, respectively), though considerably different estimates for rural price elasticities (-0.56 and -0.20, respectively). One explanation of the generally larger magnitudes of the cross-section estimates is that they reflect adjustments over a long period of time, i.e. they represent long-run elasticities of demand.

The cross-section estimates of the income (expenditure) elasticities of demand are considerably different from the time series estimates shown in Table 2.3, however. The recent estimates using HES data from the late 1980s (Goletti, 1993 and Shahabuddin and Zohir, 1995) place the expenditure elasticity in the range of 0.15 to 0.27 for urban households, and 0.39 to 0.41 for rural households. In contrast, the time series regressions show no significant contribution of income per capita in explaining rice consumption over time.⁷

Nonetheless, several studies (Osmani 1990, Chowdhury 1992, Osmani 1993, Chowdhury, 1993) have discussed the simultaneous decline in real rice prices and growth in real per capita incomes in Bangladesh in the 1980s, and have investigated the hypothesis that a worsening income distribution explains this phenomena. These studies, along with Ahmed (Forthcoming), assume that the income elasticity of demand for rice is positive. Bouis and Haddad (1992), however, argue that income elasticities of demand for food are greatly overstated by econometric analysis of cross-section household data, because of various measurement errors, such as greater losses by higher income households and greater use of food for guests and servants. If Bouis and Haddad (1992) are correct, then the lack of a significant positive coefficient for income in the above time series regressions may accurately reflect actual rice demand at the aggregate level. Given

⁷ Note that the only other time series estimate given in Table 2.4, by Alamgir and Berlarge, (1973), found a large positive income elasticity of 1.21, but this was using data from the 1950's and 1960's.

Table 2.3 — Time Series Estimates of Rice Demand Parameters in Bangladesh

Dependent Variable: natural logarithm of rice availability per capita

Sample	Constant	ln Price	Dist Dum	ln Income	Time	Durbin-Watson Statistic	R-squared	Adjusted R-squared
1980-98 19 obs	5.051* (4.464)	-0.127* (-2.121)	0.037 (1.508)	0.023 (0.186)		1.699	0.348	0.217
1980-98 19 obs	5.117 (1.682)	-0.127* (-2.010)	0.037 (0.028)	0.014 (0.039)	0.0002 (0.024)	1.697	0.348	0.161
1980-98 19 obs	7.349* (2.819)	-0.110 (-1.742)		-0.258 (-0.819)	0.0038 (0.572)	1.476	0.265	0.118
1977-98 22 obs	5.820* (6.705)	-0.109* (-1.891)		-0.071 (-0.817)		1.457	0.249	0.169
1977-98 22 obs	5.140* (5.551)	-0.127* (-2.257)	0.036 (1.661)	0.012 (0.124)		1.721	0.348	0.240
1983-98 16 obs	5.311* (3.966)	-0.153* (-2.257)	0.041 (1.440)	-0.000 (-0.002)		1.637	0.361	0.201

* Indicates significance at 95 percent confidence level.

Note: Values of t-statistics is given in parentheses.

Source: Author's calculations.

Table 2.4 — Estimates of Demand Elasticities for Rice and Wheat in Bangladesh

Author	Data	Sample Size	Type	Rice		Wheat	
				Own Price Elasticity	Expenditure Elasticity	Own Price Elasticity	Expenditure Elasticity
Alamgir and Berlarge(1973) ^a	50/51-69/70	20	National	-0.29	1.21		
Deb(1986)	BIDS 1979	444	Rural		0.87		
Bouis(1989)	HES 1973/74		Rural	-0.96	0.83	-0.10	0.19
Ahmed and Hossain(1990)	IFPRI/BIDS 1982		Rural		0.94		-0.06
Talukdar(1990)	HES 1981/82	661	Rural	-0.80	0.62	-0.39	-1.53
			Urban	-0.41	0.32	-1.72	-0.35
			National	-0.74	0.51	-0.89	-1.17
Ahmed and Shams(1993)	IFPRI, 1991/92	553	Rural	-0.12	0.68	-1.30	-0.22
Goletti(1993)	HES 1988/89	5021	Rural	-0.56	0.39	-0.82	-0.44
			Urban	-0.59	0.15	-1.06	-0.01
Shahabuddin and Zohir(1995)	HES 1989/90		Rural	-0.20	0.41	0.15	-0.07
			Urban	-0.65	0.27	0.00	0.11

^a Time Series Estimates.

the importance of understanding rice demand for food policy in Bangladesh, this issue deserves further analysis.

3. RICE PRICES AND IMPORTS SINCE TRADE LIBERALIZATION IN 1994

Since the liberalization of international trade of rice in 1994, the variation in rice prices in Bangladesh has increased and substantial quantities of rice were imported in 1995-96 and in early 1998. As shown in Figure 3.1, between April, 1994 when rice trade was liberalized, and December, 1998, there have been four distinct periods.

In the first period, from April 1994 to November, 1994, normal aman (November/December, 1993) and boro (May/June, 1994) harvests were sufficient to bring domestic supply to levels approximately equal to domestic demand at import parity prices with India. As a result, even though private import trade was liberalized, only small amounts of rice, 140,000 tons (an average of only 17.5 thousand tons per month) were imported. At least 10,100 metric tons of the 34,000 tons of rice imports for which letters of credit were opened between July and September, 1994 indicated Pakistan as the country of origin (Table 3.1). (No country of origin was specified on most of the letters of credit in this period.)

Two major events characterize the second period (December, 1994 to April, 1996): a sequence of sub-par harvests in Bangladesh and India's liberalization of rice exports in October, 1994. Three consecutive sub-par harvests greatly diminished domestic supply of rice in Bangladesh. Severe drought reduced the size of the aman 1994/95 harvest; fertilizer shortages reduced the size of the 1995 boro crop;⁸ and further

⁸ 1994/95 aman crop was small, leading to increased market prices and greater incentives for producers in the following boro season. However, the Ministry of Agriculture had authorized a large level of fertilizer exports, based on projections assuming normal price and weather conditions. Farmers, responding to high paddy prices in the boro planting season, increased their demand for fertilizer. Fertilizer shortages ensued, the open market price of fertilizer rose and the production of boro rice was only 6.54 million MT (3.5 percent below the previous year's harvest).

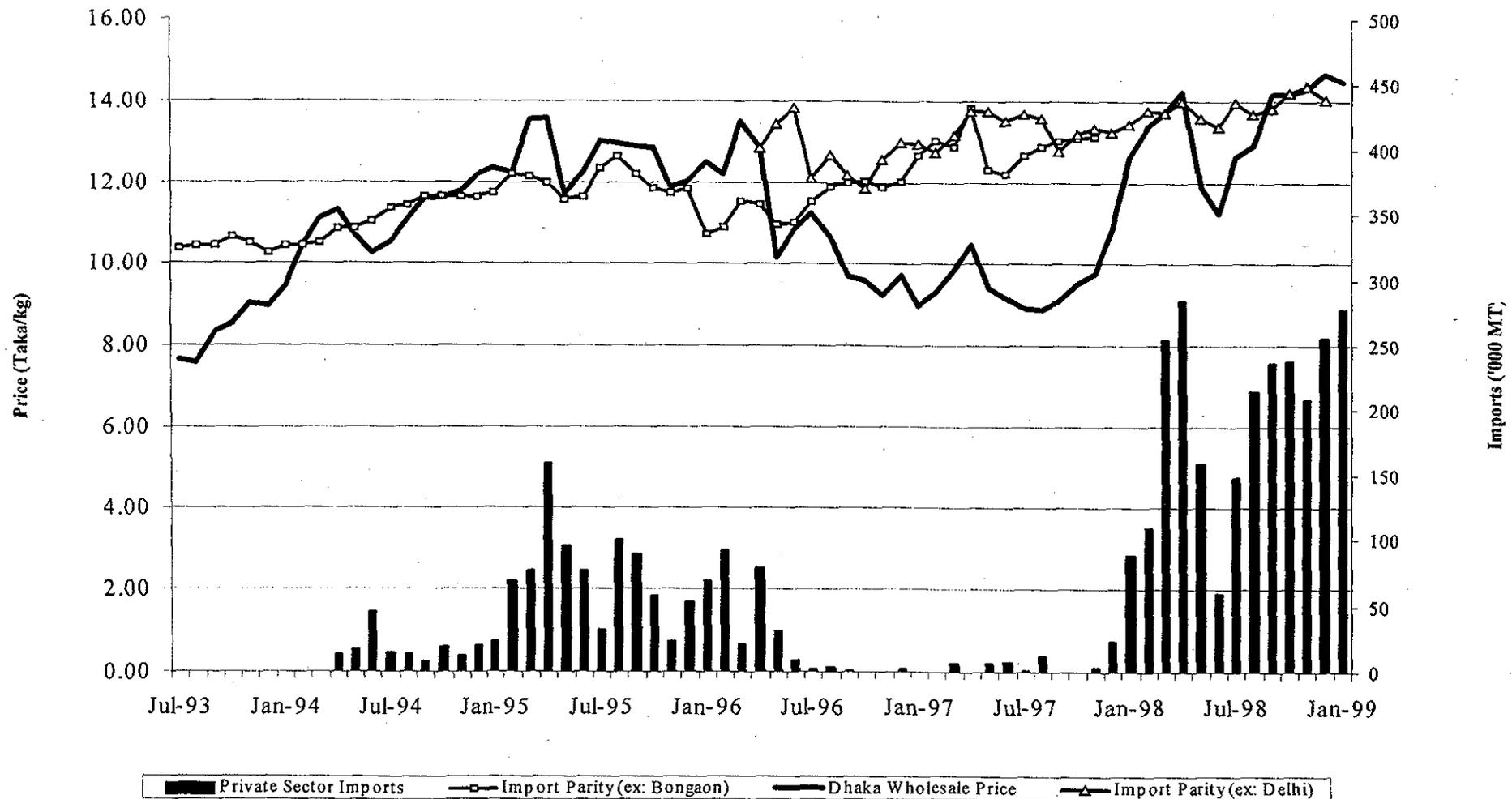
bad weather reduced the 1995/96 aman crop, as well.⁹ Moreover, India eased its quantitative restrictions on rice trade, thus freeing India's private sector to export large quantities of rice to Bangladesh. Given the poor harvests, there was a substantial excess of demand over supply at import parity prices, so that 1.127 million metric tons, (an average of 66 thousand metric tons per month), were imported by the private sector, in addition to 704 thousand metric tons imported by the government. Most of this rice came from India in small lots. As indicated by letter of credit data, the average size of the 1251 shipments of rice in 1994/95 was only 707 metric tons (Table 3.1).

Favorable weather and stable input supplies contributed to three consecutive good rice harvests: boro 1996, aman 1996/97, and boro 1997. Increased domestic supply reduced market prices to below import parity levels. As a result, private imports were no longer profitable and private sector imports essentially stopped. Real prices during this 1.5 year period were on average slightly below the long-term declining trend (Figure 3.2). In fact, prices during this period even fell below export parity. In principle, Bangladeshi rice exports would have been competitive with Indian exports in the world market. As discussed in Rahman (1998), however, lack of established market links and appropriate grading standards prevented exports from taking place.

A poor aman harvest in November/ December, 1997 initiated the fourth period, characterized by high domestic prices and large-scale imports. Paddy and rice prices rose sharply as a result of the reduced harvest. Paddy prices in Dinajpur, a major rice-surplus region, rose 18.4 percent between October and the end of December, from 5.49 Tk/kg to

⁹ After the poor aman harvest in 1994/95, the government attempted to import 800,000 MTs of rice through open tenders in February, 1995. However, contract problems involving specification and inspection contributed to delayed import arrivals, and subsequent increases in world rice prices made the export sales less attractive to exporters. As a result, only 350,000 metric tons of rice had arrived within eight months, with final deliveries not arriving until April 1996.

Figure 3.1 — Rice Prices and Quantity of Private Rice Imports in Bangladesh, 1993-99



Note: Price data for January 1999 is upto the 2nd week only; private sector imports are as of 30th January, 1999.

From November the carrying cost has increased by 1.1 Tk/kg to 4.1 Tk/kg.

Source: Dorosh (1998), calculated using data from FPMU, CMIE (1998) and Baulch, Das et. al, (1998);

Table 3.1 — Private Sector Rice Imports, 1994-95

Date	Number of Contracts	Quantity in Metric Tons	Average Quantity / Contracts (MT)	Value Million TK	Average Price (Tk/kg)
July	8	8,800	1100	72	8.2
August	14	23,562	1683	200	8.5
September	3	2,072	691	17	8.4
October	11	21,044	1913	194	9.2
November	21	83,172	3961	749	9.0
December	62	100,512	1621	938	9.3
January '95	216	236,296	1094	2,231	9.4
February	236	109,062	462	1,062	9.7
March	321	183,553	572	1,767	9.6
April	247	69,600	282	711	10.2
May	89	33,686	378	335	9.9
June	23	13,215	575	134	10.1
Total	1251	884,575	707	8,410	9.5

Source: FPMU, Letters of Credit Data Base and author's calculations.

6.50 Tk/kg. Wholesale prices of coarse rice in Dhaka, likewise rose by 30.2 percent, from 9.45 Tk/kg to 12.30 Tk/kg in the same period. These price increases are in contrast to the expected fall in market prices following the aman harvest. End of December paddy prices in Dinajpur were 31.6 percent higher than in December, 1996; December rice prices in Dhaka were 29.7 percent higher than prices twelve months earlier.

Thus, within two months of the start of the aman harvest, Bangladesh prices rose to the import parity price, i.e. the price at which imports from India became profitable. This import parity price was about 12.5 Taka/kg wholesale for HYV coarse rice in early January and rose gradually to 14.7 Taka/kg. Despite pressure for immediate large-scale foodgrain imports, the Ministry of Food opted for a cautious strategy involving only moderate increases in government imports of rice and wheat. Instead, the government encouraged private sector food imports through removal of a surcharge on rice imports, and increased OMS sales and distribution to poor households, while maintaining adequate foodgrain stock levels.

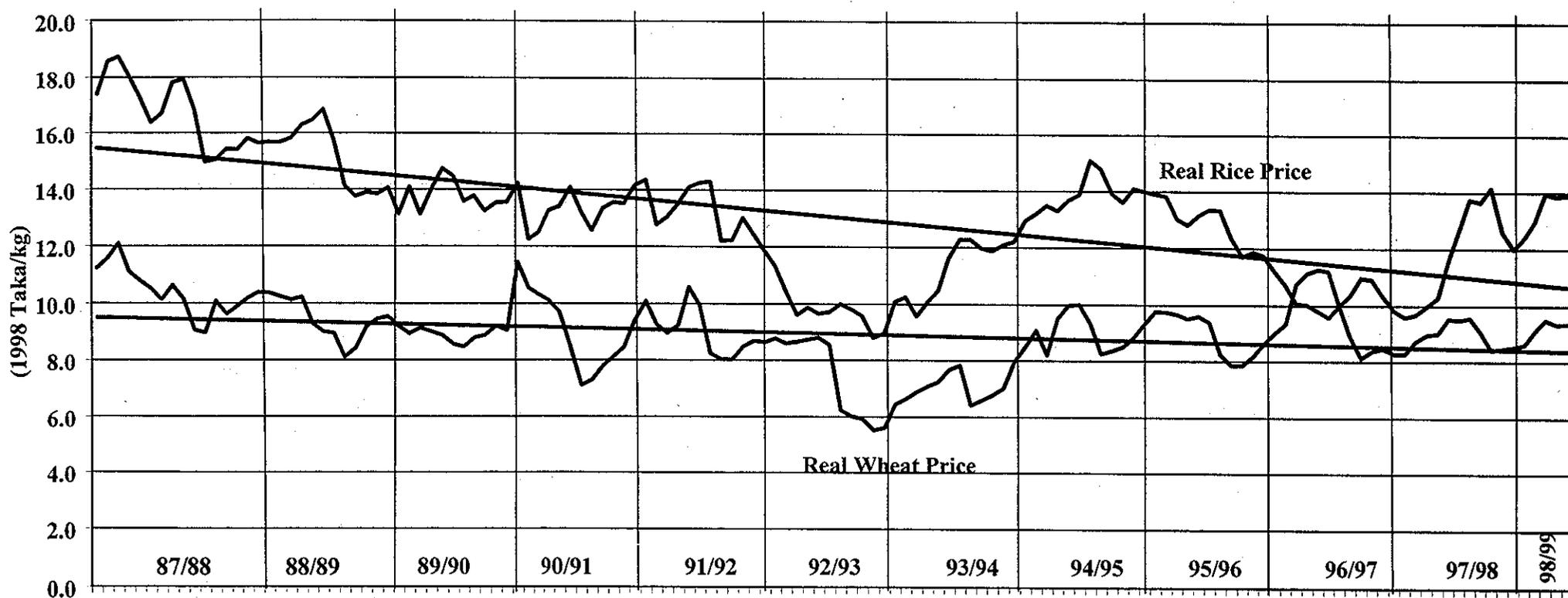
Given the price incentives for imports and the large gap between domestic supply and demand, substantial flows of private sector rice imports from India followed. From a mere trickle of 23,000 MT in December, the flows reached 254,000 and 284,000 metric tons in March and April, respectively. In all, 917,000 metric tons were imported through official channels from December 1997 to May 1998. In addition, an estimated 300,000 MT of rice were imported through informal channels, so that total imports in these six months were about 1,035,000 tons (735,000 tons through official channels and approximately 300,000 tons through informal channels).¹⁰ This trade continued throughout 1998 as extensive flooding damaged the 1998/99 aus and aman crops.

As in 1994/95, most of this trade was in small lots. Letter of credit data from January through September 1998 (up to first two weeks) show the average quantity was

¹⁰ See Shahabuddin and Dorosh, 1999 for a description of cross-border rice flows in January, 1998.

only 268.7 metric tons per letter of credit for the 3291 letters of credit issued (Table 3.2). Moreover, these letters of credit were opened by 793 different traders, with an average amount of imports per trader of only 1115.3 MTs of rice. The largest ten traders (in terms of total imports) imported 142,369 tons, 16 percent of the total. Given this broad participation in the rice import trade, and the small share of the largest suppliers, it appears that there has been little scope for individuals or a small group of traders to significantly affect market prices by restricting market supply.

Figure 3.2 – National Average Real Wholesale Price of Rice and Wheat, 1987-98



Note: Prices are deflated using the non-food Dhaka middle-income Cost of Living Index (and the national CPI after June 1998).
 Source : FPMU data and author's calculation.

Table 3.2 — Private Sector Rice Imports, January through September 1998

Date	Number of Contracts	Weekly Quantity in Metric Tons	Average Quantity / Contract (MT)	Weekly Value Million Tk	Average Price (Tk/kg)
January					
1st week	81	12896	159.2	131.6	10.20
2nd week	116	16593.18	143.0	174.2	10.50
3rd week	98	27102.63	276.6	282.1	10.41
4th week	88	18826.19	213.9	201.7	10.71
Sub -Total	383	75418	196.9	789.5	10.47
February					
1st week	83	18079	217.8	190.0	10.51
2nd week	119	33657	282.8	390.0	11.59
3rd week	27	3311	122.6	33.0	9.97
4th week	31	23108	745.4	271.0	11.73
Sub -Total	260	78155	300.6	884.0	11.31
March					
1st week	182	23348	128.3	241.9	10.36
2nd week	380	58151	153.0	621.8	10.69
3rd week	294	57901	196.9	619.4	10.70
4th week	258	40140	155.6	434.8	10.83
Sub -Total	1114	179,540	161.2	1917.9	10.65

Continued

Table 3.2 — Private Sector Rice Imports, January through September 1998 (Cont.)

Date	Number of Contracts	Weekly Quantity in Metric Tons	Average Quantity / Contract (MT)	Weekly Value Million Tk	Average Price (Tk/kg)
April					
1st week	163	83228	510.6	958.9	11.52
2nd week	163	30419	186.6	324.8	10.68
3rd week	73	15533	212.8	167.7	10.80
4th week	66	12951	196.2	139.0	10.73
Sub -Total	465	142,131	305.7	1590.4	10.93
May					
1st week	51	17371	340.6	186.3	10.72
2nd week	58	25639	442.1	263.6	10.28
3rd week	32	12470	389.7	125.1	10.03
4th week	20	5837	291.9	56.7	9.71
Sub -Total	161	61,317	380.9	631.6	10.19
June					
1st week	21	5230	249.0	52.6	10.05
2nd week	22	4631	210.5	47.8	10.33
3rd week	64	43122	673.8	489.8	11.36
4th week	102	32595	319.6	332.8	10.21
Sub -Total	209	85,578	409.5	923.0	10.49

Continued

Table 3.2 — Private Sector Rice Imports, January through September 1998 (Cont.)

Date	Number of Contracts	Weekly Quantity in Metric Tons	Average Quantity / Contract (MT)	Weekly Value Million Tk	Average Price (Tk/kg)
July					
1st week	53	14089	265.8	148.9	10.57
2nd week	103	33094	321.3	341.2	10.31
3rd week	83	19710	237.5	208.7	10.59
4th week	16	2995	187.2	31.7	10.58
Sub -Total	255	69,888	274.1	730.4	10.51
August					
1st week	107	25578	239.0	268.3	10.49
2nd week	88	20532	233.3	217.7	10.60
3rd week	130	27476	211.4	293.6	10.69
4th week	180	46950	260.8	500.0	10.65
Sub -Total	505	120,536	238.7	1279.6	10.61
September					
1st week	151	40188	266.1	432.5	10.76
2nd week	48	31680	660.0	355.0	11.21
3rd week					
4th week					
Sub -Total	199	71,868	361.1	787.5	10.98
Total	3291	806,276	245.0	8649.92	10.68

Source: FPMU, Letters of Credit data base (sample available to DG Food as of 14th September, 1998), and author's calculations.

4. INDIA'S FOODGRAIN MARKETS

No single foodgrain dominates India's food consumption as does rice in Bangladesh. Rice accounts for 73.4 percent of calories consumed in Bangladesh, but only 32.3 percent of calories consumed in India (Table 4.1). In India, wheat (20.1 percent) and other foodgrains (sorghum, millet and maize, 10.7 percent) are the major foodgrains in certain regions of the country. Thus, on a national basis, though rice is the leading food in India in terms of calories consumed, annual rice consumption was only 78.7 kilograms per capita, only half of per capita rice consumption in Bangladesh. Nonetheless, given the nearly eight-fold difference in population between the two countries (944 million people in India compared with 120 million people in Bangladesh in 1995-96), total rice consumption in India is 4.1 times greater than in Bangladesh, and total wheat consumption is 25 times greater than in Bangladesh. Moreover, in contrast to Bangladesh, imports have accounted for only a small share of foodgrain supply throughout the seventies and eighties, and in recent years India has been a small net exporter of foodgrain. In 1996, India's net rice exports were 2.451 million MT (2,504 thousand MT of exports less 53 thousand of imports); net wheat exports were 0.983 million MT, (Table 4.2).

In understanding the impact of India's foodgrain markets on Bangladesh, it is important to consider both the seasonal and regional patterns of production. As shown in Table 4.3, nearly 90 percent of India's rice is produced in the kharif (aman) season. Thus, during this season, India's production of rice is about 70 million metric tons (milled equivalent), nearly eight times that of Bangladesh (about 9 million tons). In contrast, India's rice production during the rabi season is approximately the same magnitude as in the corresponding boro and aus seasons in Bangladesh (9.9 million tons in India and 9.33 million tons in Bangladesh in 1996-97). Thus, Bangladesh rice production is only a small

Table 4.1 — Foodgrain Production and Consumption in Bangladesh and India, 1996

	Bangladesh					
	Production 000 MT	Import 000 MT	Export 000 MT	Consumption kg/cap/Year	Consumption Cal/cap/day	Calorie Share
Rice	18,799	624	0	155.2	1,546	73.4%
Wheat	1,369	1,111	0	20.6	176	8.4%
Other Foodgrain	69	5	0	0.5	5	0.2%
Total Foodgrain	20,237	1,740	0	176.3	1,727	82.0%
Total Food					2,105	100.0%

Population : 120.07 Million

	India					
	Production 000 MT	Import 000 MT	Export 000 MT	Consumption kg/cap/Year	Consumption Cal/cap/day	Calorie Share
Rice	81,249	53	2,504	78.7	781	32.3%
Wheat	62,620	627	1,610	56.8	485	20.1%
Other Foodgrain	33,550	2	90	30.5	258	10.7%
Total Foodgrain	177,419	682	4,204	166	1,524	63.1%
Total Food					2,415	100.0%

Population : 944.58 Million

Source: FAO, Food Balance Sheets.

Table 4.2 — Rice and Wheat Production, Trade and Stock Changes in India, 1991-96

Crops & Year	Production (‘000’ MT)	Imports (‘000’ MT)	Stock Changes (‘000’ MT)	Exports (‘000’ MT)	Total Supply (‘000’ MT)	Net Imports/ Total Supply (Percent)
Rice						
1991	74,732	100	3,478	680	77,630	-0.7%
1992	72,704	176	4,786	582	77,083	-0.5%
1993	80,440	139	-1,398	770	78,411	-0.8%
1994	81,080	63	-1,155	903	79,084	-1.1%
1995	79,668	53	4,595	4,927	79,389	-6.1%
1996	81,249	53	2,679	2,504	81,477	-3.0%
Wheat						
1991	55,134	0	2,488	662	56,960	-1.2%
1992	55,690	1,364	-1,257	39	55,757	2.4%
1993	57,210	243	-528	6	56,918	0.4%
1994	59,840	2	-514	96	59,232	-0.2%
1995	65,767	11	-2,221	1,149	62,408	-1.8%
1996	62,620	627	300	1,610	61,937	-1.6%
Rice and Wheat						
1991	129,866	100	5,966	1,342	134,590	-0.9%
1992	128,394	1,540	3,529	621	132,840	0.7%
1993	137,650	382	-1,926	776	135,329	-0.3%
1994	140,920	65	-1,669	999	138,316	-0.7%
1995	145,435	64	2,374	6,076	141,797	-4.2%
1996	143,869	680	2,979	4,114	143,414	-2.4%

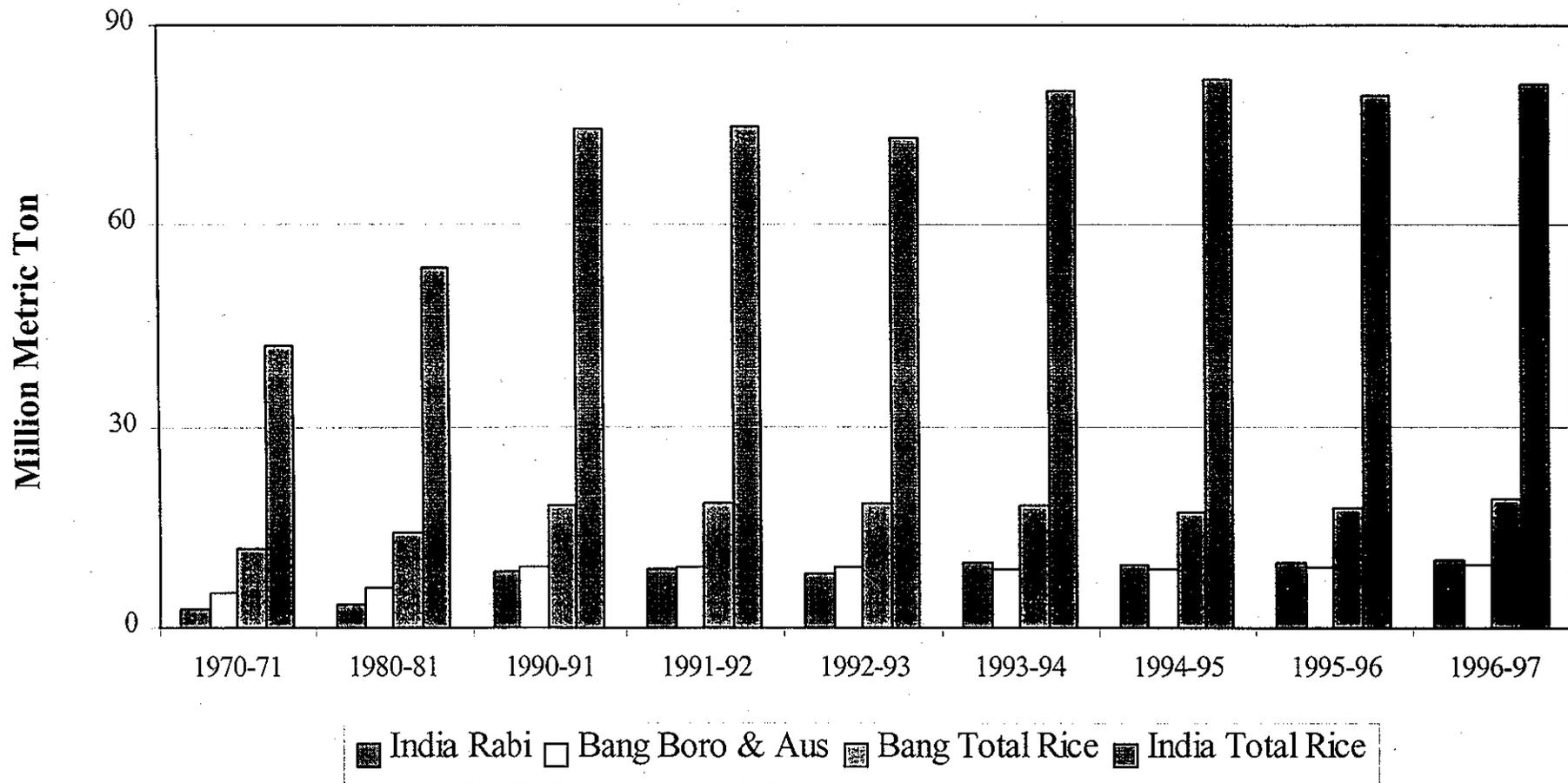
Source: Food Balance Sheet of India (1991-95), F.A.O.

Table 4.3 — Seasonal Production of Rice and Wheat in India, 1971-96

Year	Rice (Kharif)			Rice(Rabi)			Total Rice			Kharif Rice/ Production	Wheat (Rabi)		
	Area (mn ha)	Yield kg/ha	Prod. mn MT	Area mn ha	Yield kg/ha	Prod. mn MT	Area (mn ha)	Yield kg/ha	Prod. mn MT		Area (mn ha)	Yield kg/ha	Prod. mn MT
1970-71	36.0	1,100	39.6	1.6	1,625	2.6	37.6	1,123	42.2	94%	18.2	1,307	23.8
1980-81	38.4	1,303	50.0	1.7	2,071	3.5	40.1	1,336	53.6	93%	22.3	1,630	36.3
1990-91	39.7	1,670	66.3	3.0	2,671	8.0	42.7	1,740	74.3	89%	24.2	2,281	55.2
1991-92	39.6	1,676	66.4	3.1	2,720	8.4	42.7	1,751	74.8	89%	23.3	2,394	55.8
1992-93	38.9	1,677	65.2	2.9	2,653	7.7	41.8	1,744	72.9	89%	24.6	2,327	57.2
1993-94	39.1	1,807	70.7	3.4	2,816	9.6	42.5	1,888	80.2	88%	25.2	2,380	60.0
1994-95	39.4	1,841	72.5	3.4	2,731	9.3	42.8	1,911	81.8	89%	25.7	2,559	65.8
1995-96	39.5	1,776	70.2	3.4	2,761	9.4	42.9	1,855	79.5	88%	25.1	2,493	62.6
1996-97	39.6	1,801	71.4	3.6	2720.4	9.9	43.3	1880	81.3	88%	25.9	2,671	69.3

Source: Government of India (1997)

Figure 4.1 — Seasonal Rice Production in Bangladesh and India



Source :GOI (1997),GOI(1998) and FPMU,MOF

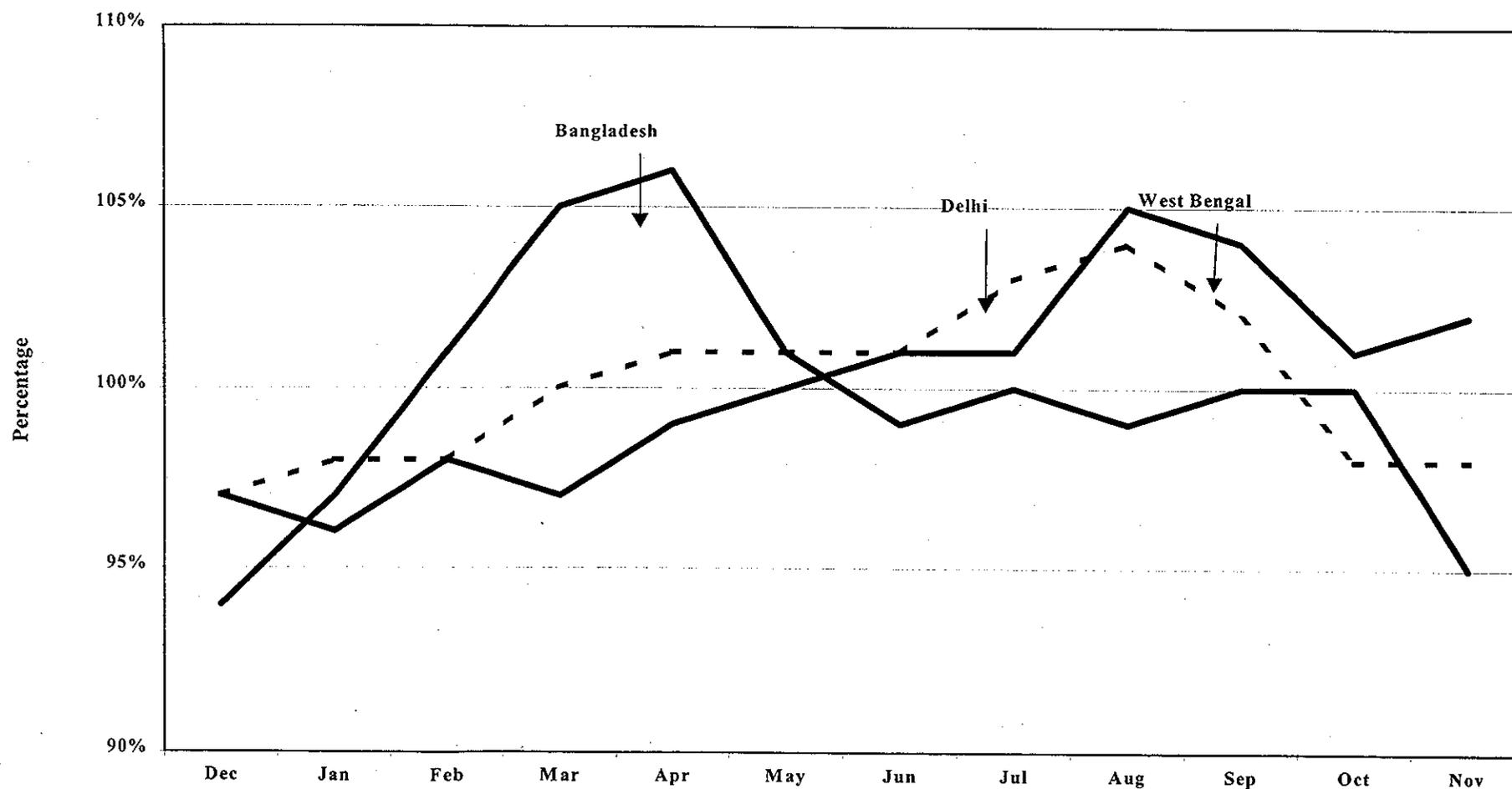
share of the total regional production of rice during the aman (kharif) season, while it is approximately half of the regional production in the boro/aus (rabi) season (Figure 4.1). Wheat is cultivated during the rabi (boro) season in both India and Bangladesh.

Figure 4.2 shows the seasonal patterns of rice prices in Bangladesh and India. Given the more balanced seasonal production pattern in Bangladesh, with aman and boro / aus each accounting for about half of production, the peak price in Bangladesh occurs in April, just prior to the boro harvest. In India, the rice price peaks in August, just prior to the main kharif harvest. Government market interventions and the large wheat harvest in the rabi season help stabilize rice prices in India, as well, so that the seasonal fluctuation in rice prices is smaller in India than in Bangladesh. In India, peak prices (in August) are on average 9.3 (West Bengal) and 7.2 percent (Delhi) above the lowest prices (in January in West Bengal, and in December in Delhi). On average, in the 1990s, Bangladesh prices at their peak in April have been 12.5 percent higher than at their lowest point (in December).

In India, rice production is concentrated in the Ganges river basins, Punjab, and the southern states of Andhra Pradesh and Tamil Nadu, (Table 4.4 and Map 4.1). West Bengal, produces about 12.6 million metric tons of rice annually, (equal to 15.5 percent of India's production and about two-thirds of Bangladesh rice production). Assam, which borders Bangladesh on the north, has an annual production of about 3.3 million metric tons. The two other states bordering Bangladesh (Meghalaya and Tripura) produce little rice, less than 0.7 million metric tons in total. Average rice yields in West Bengal, (2.18 metric tons/hectare in 1996/97, rice equivalent) are 17 percent higher than in Bangladesh (1.86 metric tons/hectare or 0.75 tons per acre in 1996/97).

More than 90 percent of India's wheat is produced in the six northern states of Punjab, Haryana, Rajasthan, Uttar Pradesh, Madhya Pradesh and Bihar (Table 4.5). Wheat yields in India (2.67 metric tons/hectare) are 30 percent higher than those in Bangladesh (2.05 metric tons/hectare, or 0.83 tons per acre in 1996/97).

Figure 4.2 — Seasonality Indices of Rice Price in Bangladesh, West Bengal and Delhi



Notes : Bangladesh National Average Wholesale Coarse Rice Price (July 1990-June 1997); Delhi Month-end Wholesale Parmal Rice Price (Oct 1984-Nov 1997); West Bengal Wholesale Gr III and Patnai (F) Price (July 1990-Nov 1997).

Table 4.4 — Indian Rice Production in 1996/97

State	1996/97 Rice Area ' 000 Hectare	1996/97 Production ' 000 MT	1996/97 Yield MT/Per Hectare
Andhra Pradesh	3970	9900	2.49
Arunachal Pradesh	122	140	1.15
Assam	2492	3328	1.34
Bihar	5071	7236	1.43
Goa	54	148	2.76
Gujarat	642	946	1.47
Haryana	831	2466	2.97
Himachal Pradesh	81.70	109	1.33
Jammu & Kashmir	275	431	1.57
Karnataka	1347	3148	2.34
Kerala	432	838	1.94
Madhya Pradesh	5292	6201	1.17
Maharashtra	1478	2614	1.77
Meghalaya	106	120	1.14
Mizoram	65	111	1.72
Nagaland	140	153	1.09
Orissa	4461	4376	0.98
Punjab	2160	7338	3.40
Rajasthan	147	174	1.18
Tamil Nadu	2269	6061	2.67
Tripura	259	545	2.10
Uttar Pradesh	5550	11773	2.12
West Bengal	5801	12637	2.18
Others	240	518	2.16
All India	43283	81312	1.88
Border States ^a	8,722	16,741	1.92

^a States Bordering Bangladesh : West Bengal, Assam, Meghalaya, Mizoram and Tripura;
Source: Government of India (1997) and Agarwal and Varma (1997), CMIE.

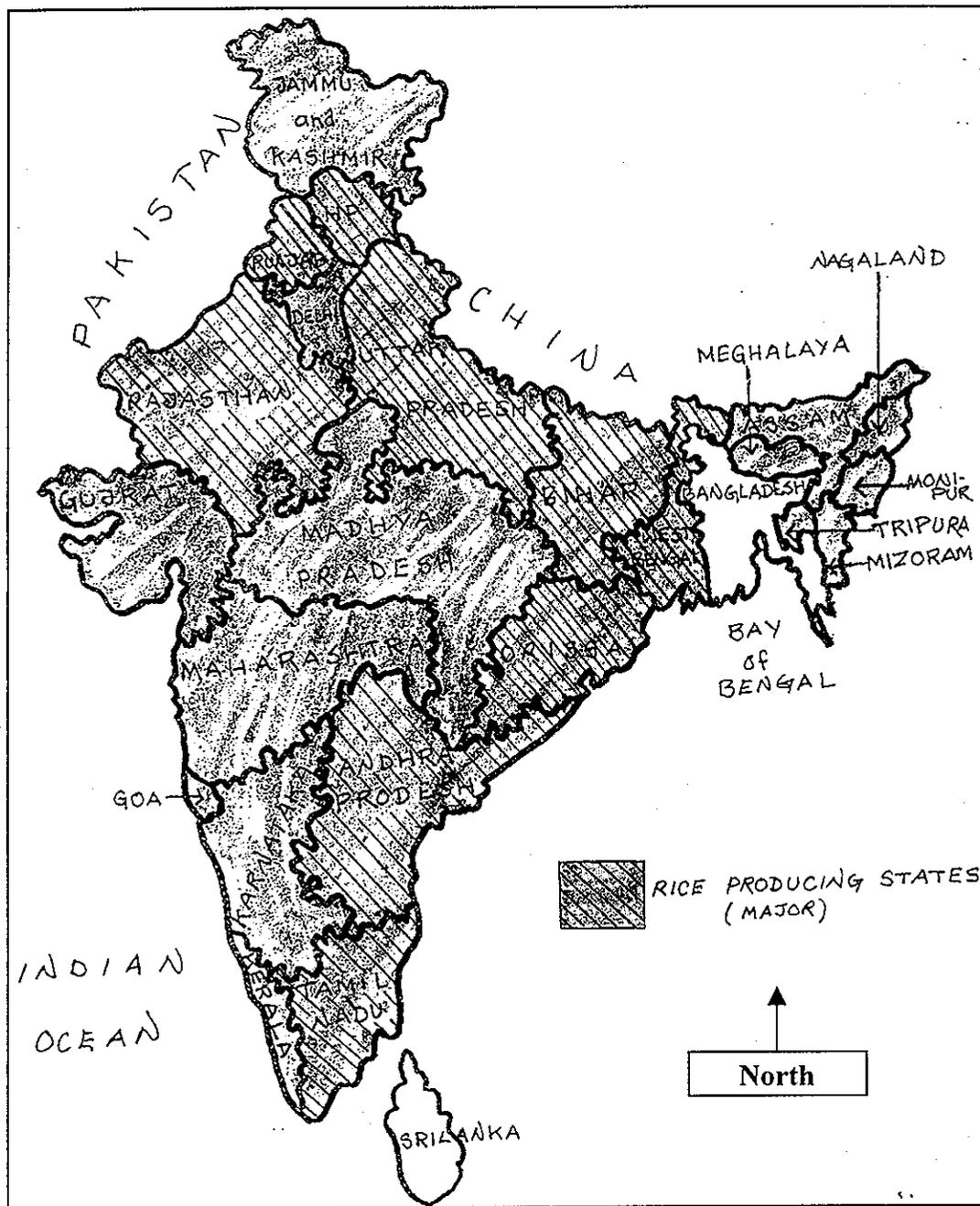
Table 4.5 — Indian Wheat Production in 1996/97

State	1996/97 Wheat Area ' 000 Hectare	1996/97 Production ' 000 MT	1996/97 Yield MT/Per Hectare
Andhra Pradesh	9	6.30	0.68
Arunachal Pradesh	4	6.10	1.42
Assam	88	117.10	1.33
Bihar	2127	4610.50	2.17
Gujarat	581	1336.00	2.30
Goa	na	na	na
Haryana	2019	7832	3.88
Himachal Pradesh	357	531	1.49
Jammu & Kashmir	242	409	1.69
Karnataka	248	190	0.77
Kerala	na	na	na
Madhya Pradesh	4206	7384	1.76
Maharashtra	799	1167	1.46
Manipur	na	na	na
Meghalaya	4	6	1.45
Mizoram	na	na	na
Nagaland	na	na	na
Orissa	5	7	1.32
Punjab	3230	13679	4.23
Rajasthan	2473	6776	2.74
Tamil Nadu	na	na	na
Tripura	na	na	na
Uttar Pradesh	9151	24332	2.66
West Bengal	351	839	2.39
Sikim	na	na	na
Others	39	48	1.22
All India	25934	69275	2.67
Border States^a	443	962	2.17

^a States Bordering Bangladesh : West Bengal, Assam and Meghalaya.

Source: Government of India (1997) and Agarwal and Varma (1997), CMIE.

Map 4.1 — Major Rice Producing States in India



FOODGRAIN MARKETS, GOVERNMENT POLICY AND THE FOOD CORPORATION OF INDIA

Since independence, India has maintained a large Public Distribution System for major food commodities. Fixed procurement prices and state procurement targets for rice and wheat are set annually by the central government, and state government institutions or cooperatives procure grain on behalf of the Food Corporation of India (FCI). In 1995/96 the FCI sold 26.3 million tons of cereals (Radhakrishna and Subbarao, p. 19) equal to about 1/6 of total production of rice and wheat.

As shown in Table 4.6 and Figure 4.3, rice procurement has varied between 9.24 and 13.7 million tons in the 1990s, (between 12 and 17 percent of production). Rice procurement is done mainly through a compulsory levy on rice millers. The implicit tax is substantial, as procurement prices for paddy are substantially below wholesale market prices. At a 0.67 milling ratio, the procurement price of paddy in rice equivalent terms was on average 33 percent below the wholesale market price of rice in Dehli from 1995-97, allowing little margin for milling and marketing costs. About 90 percent of rice procurement is from only five states: Andhra Pradesh, Haryana, Punjab, Tamil Nadu and Uttar Pradesh.

Wheat procurement in the 1990s has ranged from 6.4 to 12.8 million MT, equal to between 11 and 22 percent of production (Table 4.7 and Figure 4.4). In contrast to rice, wheat is generally purchased in wholesale markets at the fixed procurement price. Almost all wheat procurement comes from only three states: Punjab, Haryana and Uttar Pradesh.

State governments are responsible for distribution of the foodgrain to ration cardholders through fair-price shops; they also determine the size of the ration, price and target group (Radhakrishna and Subbarao, 1997, p.84). These distribution programs are not well-targeted to the poor and result in major costs to the government.

Table 4.6 — Rice Production and F.C.I. Market Intervention in India (1984/85-97/98)

Year	Production (Milled quiv.) (mn MT)	Procurement			Distribution		Stock (mn MT)	Wholesale Price of Rice (Rs/Qtl)
		Quantity (mn MT) (Oct - Sep)	As share of Production	Paddy Price (Rs/Qtl)	Quantity (mn MT)	Rice Price (Rs/Qtl)		
1984-85	58.33						6.74	308
1985-86	64.20	8.86	13.8%				9.06	318
1986-87	60.55	8.24	13.6%				8.50	298
1987-88	56.86	6.33	11.1%	150			5.91	371
1988-89	70.48	6.94	9.8%	160			4.09	407
1989-90	73.57	10.88	14.8%	185			5.65	431
1990-91	74.30	11.74	15.8%	205			8.66	512
1991-92	74.70	9.24	12.4%	230	10.17		8.63	530
1992-93	72.90	11.79	16.2%	270	9.69		8.52	526
1993-94	80.30	13.65	17.0%	310	9.10		11.17	698
1994-95	81.80	13.40	16.4%	340	8.01		17.42	690
1995-96	79.60	9.95	12.5%	360	9.75		15.41	811
1996-97	80.50	12.22	15.2%	380	12.04		12.90	898
1997-98	82.12	12.51*	15.2%	415	9.04**	350 (BPL) 550 (APL)	11.5(P)	914
Ave.1996-98	81.31	11.86	14.7%	360	12.04		15.24	800

Notes: * As on April 17, 1998;

** Public distribution from April to February; (P) means Provisional.

Stock figures are stocks as of 1st January; wholesale price is Delhi wholesale price.

APL denotes above poverty line; BPL denotes below poverty line.

Source: GOI (1997), Economic Survey 1996-97; GOI (1998); GOI, Directorate of Economics and Statistics, Ministry of Agriculture; CMIE

Table 4.7 — Wheat Production and F.C.I. Market Intervention in India (1984/85-97/98)

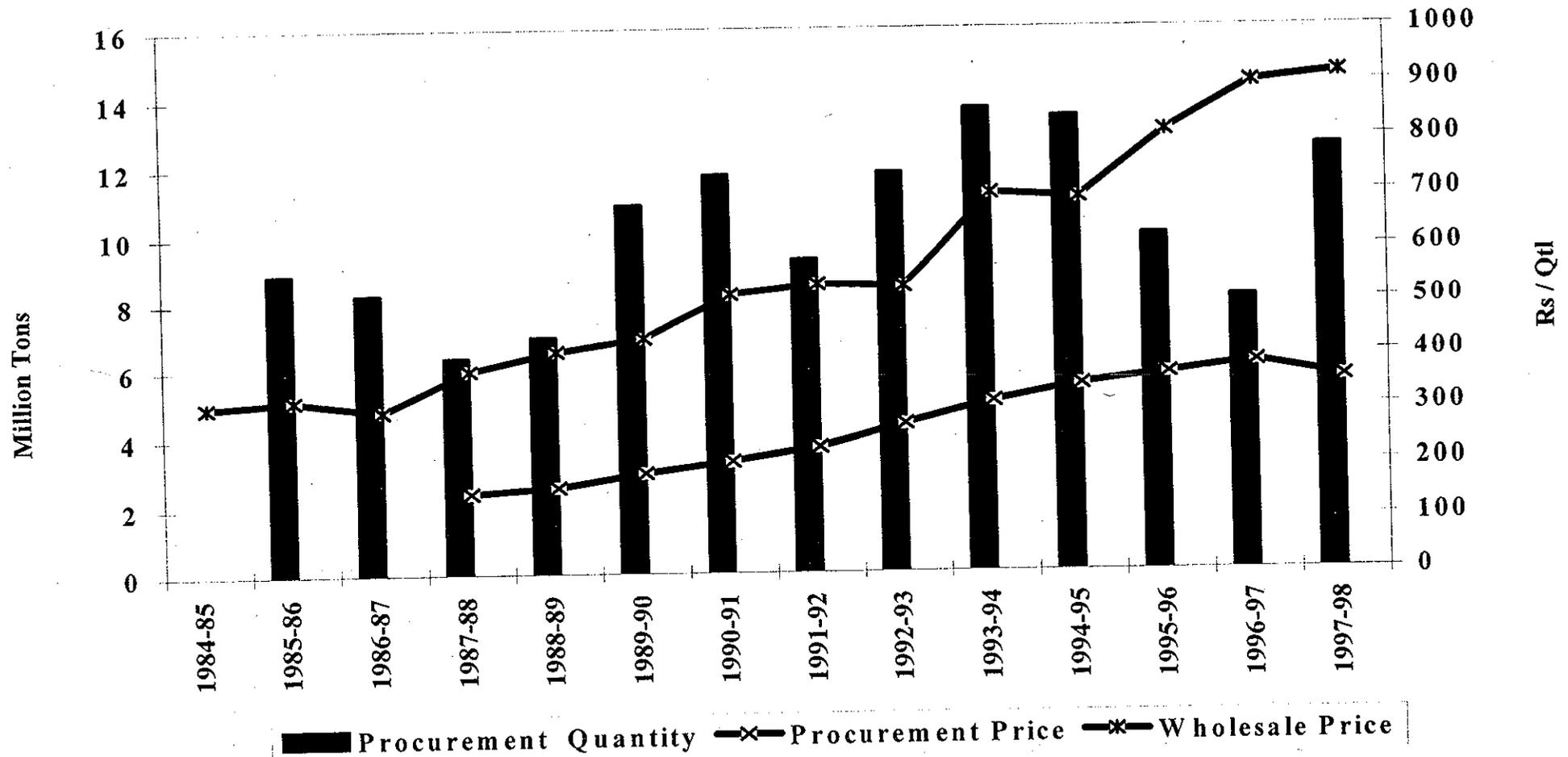
Year	Production (mn MT)	Procurement (April - March)			Distribution		Stock (mn MT)	Wholesale Price of Wheat (Rs/Qtl)
		Quantity (mn MT)	As share of Production	Wheat Price (Rs/Qtl)	Quantity (mn MT)	Wheat Price (Rs/Qtl)		
1984-85	44.10					14.54	183	
1985-86	47.05	10.34	22.0%			14.93	184	
1986-87	44.30	10.53	23.8%			13.93	195	
1987-88	46.20	7.88	17.1%	173		7.35	213	
1988-89	54.10	6.58	12.2%	183		4.44	257	
1989-90	49.90	8.94	17.9%	215		5.61	238	
1990-91	55.10	11.07	20.1%	225		9.24	284	
1991-92	55.70	7.75	13.9%	280	8.83	5.28	349	
1992-93	57.20	6.38	11.2%	330	7.85	3.28	365	
1993-94	59.80	12.83	21.5%	350	6.09	10.82	385	
1994-95	65.80	11.87	18.0%	360	5.11	12.88	414	
1995-96	62.60	12.33	19.7%	380	5.81	13.15	432	
1996-97	68.70	8.14	11.8%	475	9.35	7.10	580	
1997-98	66.05	9.30*	14.1%	510	6.35**	6.7(P)	653	
						250(BPL) 450 (APL)		
Ave.1996-97	67.38	8.72	12.9%	405	7.85	6.9		

*As on April 17, 1998; ** Public Distribution from April to February; (P) Provisional

Notes: Stock figures are stocks as of 1st January; wholesale price is Dehli wholesale price.

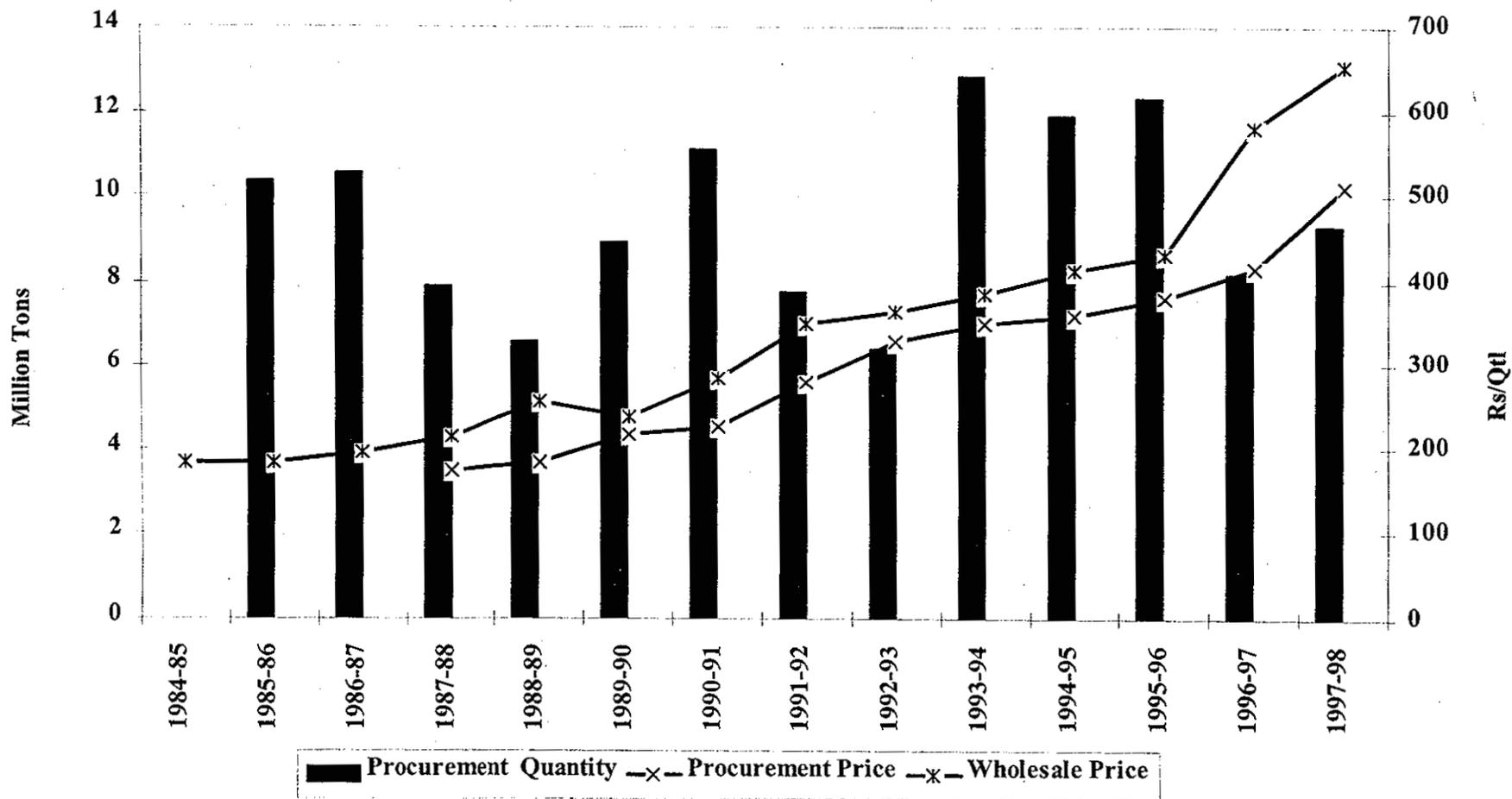
Source: GOI (1997), Economic Survey 1996-97; GOI (1998); GOI, Directorate of Economics and Statistics, Ministry of Agriculture; CMIE.

Figure 4.3 — Procurement Quantity and Price, and Wholesale Price of Rice in India (1984/85-97/98)



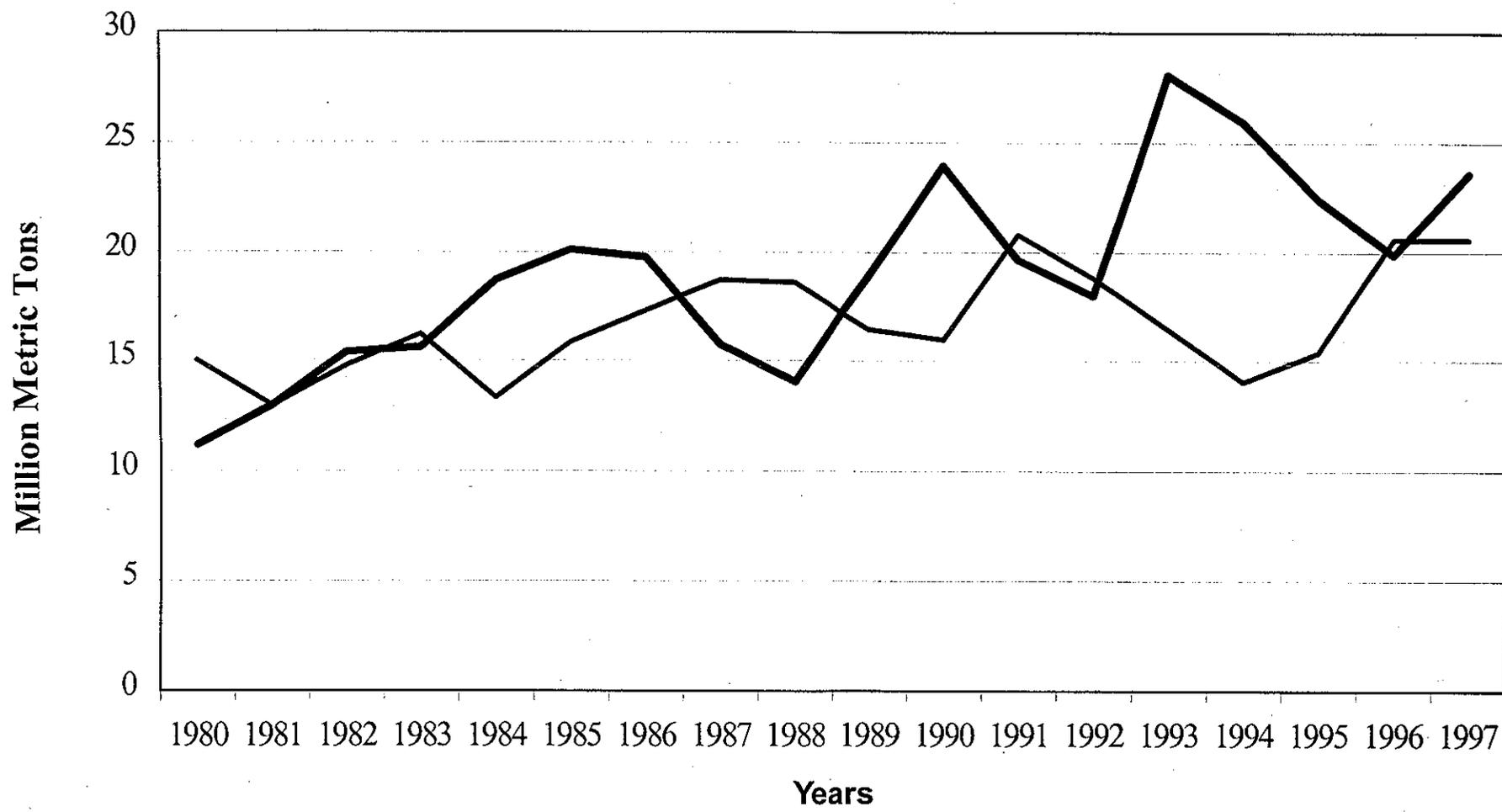
Source : Economic Survey 1996-97, 197-98; Government of India; and Directorate of Economics and Statistics, Ministry of Agriculture, India; CMIE 1998.

Figure 4.4 — Procurement Quantity and Price, and Wholesale Price of Wheat in India (1984/85-97/98)



Source : Economic Survey 1996-97,1997-98; Government of India; and Directorate of Economics and Statistics, Ministry of Agriculture, India; CMIE 1998.

Figure 4.5 — Government Foodgrain Procurement and Distribution in India, 1980-97



Source : GOI (1997)

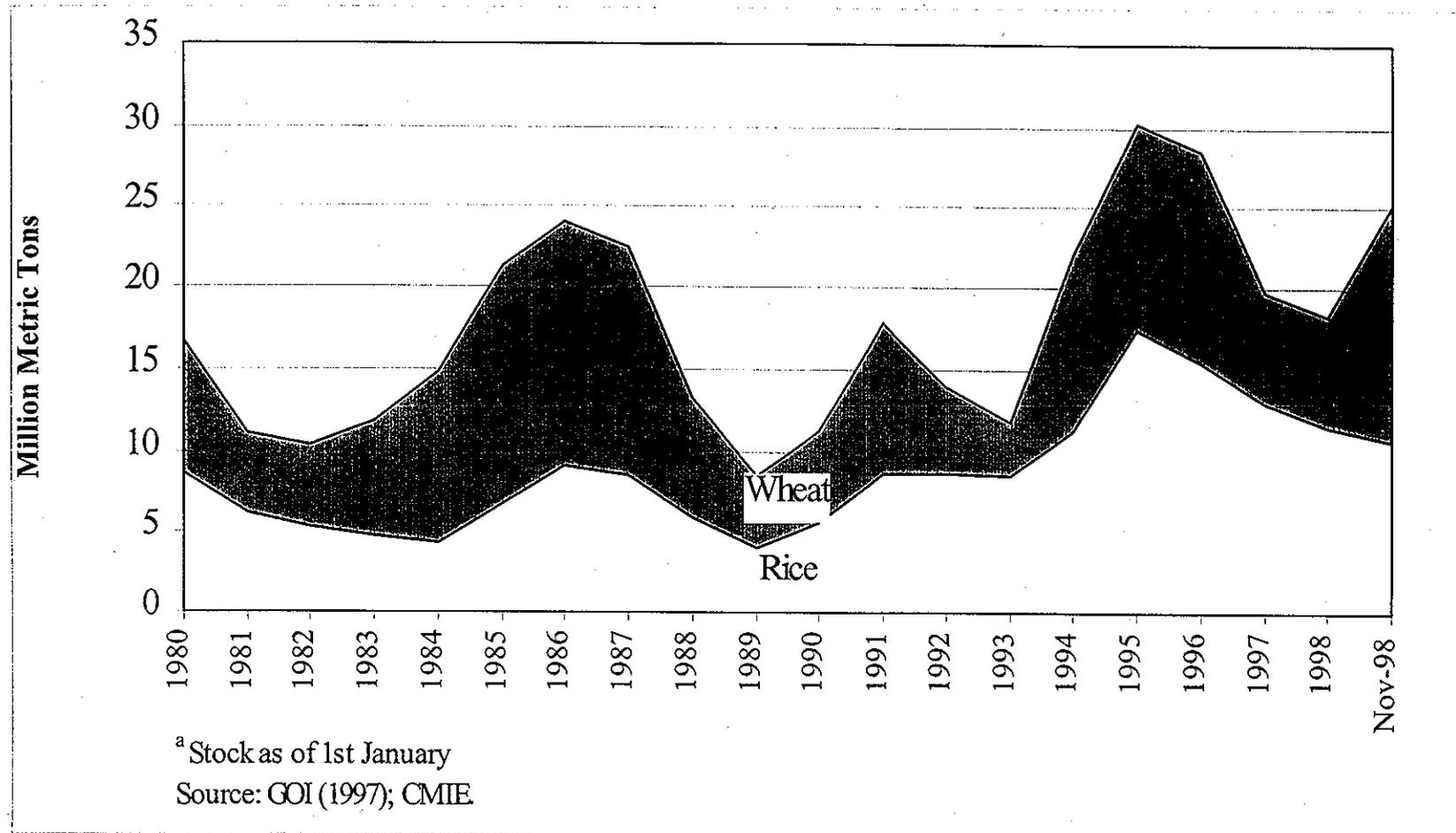
— Procurement — Distribution

From 1990-91 to 1994-95, minimum support prices were raised substantially for wheat (60 percent) and rice (66 percent.), resulting in a substantial increase in procurement. At the same time, issue prices set uniformly for sales to state governments, were also raised, resulting in less offtake (Figure 4.5).

Between 1992/93 and 1994/95, rice stocks more than doubled, from 8.5 to 17.4 million MTs and wheat stocks rose by 9.6 million MTs, from a very low 3.3 million MTs to 12.9 million MTs (Figure 4.6). FCI stocks thus rose to 35.6 million MTs in July 1995, exceeding its target of 22.3 million tons by 13.3 million MTs (Radhakrishna and Subbarao, p. 23). Storage losses in maintaining these stocks along with price subsidies in distribution have resulted in large fiscal costs. Since then, offtake has again increased somewhat for both wheat and rice, and sales price and ration size now vary for households Above the Poverty Line (APL) and Below the Poverty Line (BPL).

Prior to 1994, both rice and wheat exports were subject to quantitative restrictions, but given increased production and government stocks, rice and durum wheat exports were liberalized in October, 1994. Since that time India has exported significant quantities of rice though at a 20 percent discount (about \$60/MT) relative to Thai export prices (World Bank, 1996, p.91). Indian wheat exports also face a discount on the world market, (about \$26/MT, or 15 percent). Quotas on wheat exports were re-imposed in 1996 and 1997, however.

Figure 4.6 — Central Pool Foodgrain Stocks of India, 1980-98^a



5. MARKET PRICES AND IMPORTS FOLLOWING THE 1997/98 AMAN SHORTFALL

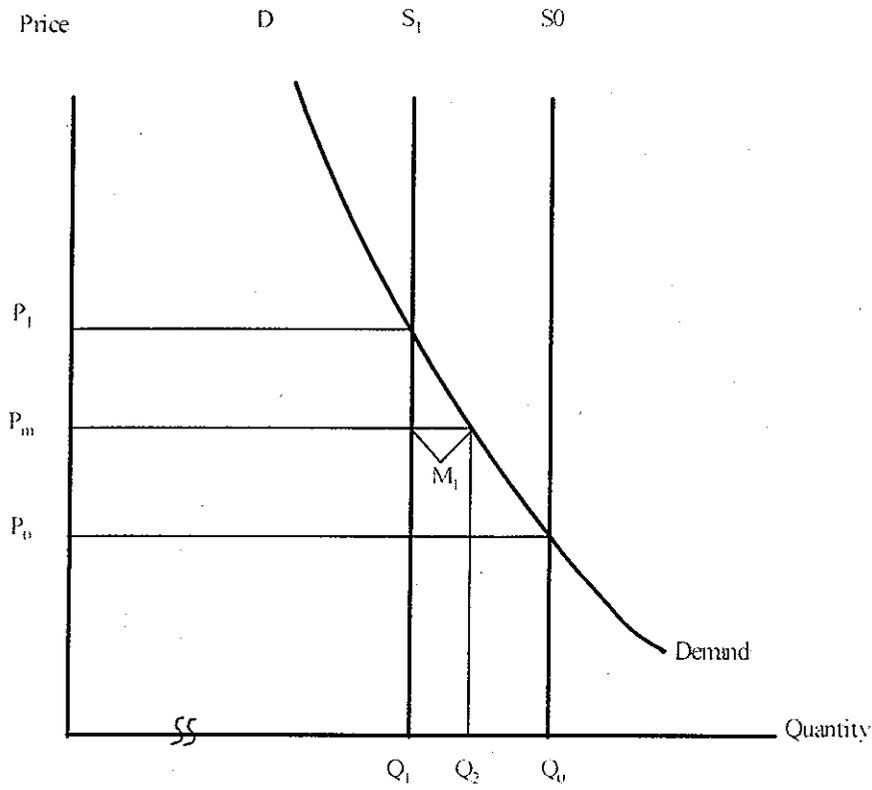
The 1997/98 aman rice harvest in Bangladesh was lower than expected, mainly because of the high prevalence of empty husks (chita) in the harvested paddy. Official pre-harvest forecasts were for 9.74 million metric tons of milled rice. An USAID rapid appraisal survey completed in January, 1998 estimated production to be 8.50 million metric tons; the final BBS estimate was 8.85 million metric tons. Thus, official estimates put 1997/98 aman production about 700 thousand tons (7.3 percent) below 1996/97 aman production of 9.55 million tons.

Prices rose steeply beginning in November, 1997, and as discussed in Chapter 3, substantial quantities of rice were imported from India by the private sector. This chapter presents a simple model of domestic rice prices, supply, demand and imports, which is used to analyze the effects and magnitude of the production shortfall. The analysis focuses on the six month period following the aman harvest: November, 1997 to April, 1998. As argued below, the import figures and model simulations suggest that the shortfall was even larger than the above estimates indicate.

PARTIAL EQUILIBRIUM ANALYSIS

This large volume of imports that have come from India has resulted from an excess of domestic demand over domestic supply at the import parity price (Figure 5.1). Projected domestic supply from the aman harvest is indicated by S_0 ; the actual harvest was smaller, as indicated by S_1 . At the import parity price of P_m , domestic demand is Q_2 , and the difference between Q_2 and Q_1 is the sum of private imports, change in private stocks and net market injections by the government.

Thus, the amount of rice imported by the private sector depends on four factors: the size of the aman harvest (S_1), net market injections by the government, the change in

Figure 5.1 — Effects of a Production Shortfall

Source: Author

private stocks, and the response of domestic consumers to the increase in rice prices, as reflected in the slope of the demand curve.

A simple quantitative model of rice markets illustrates the importance of these factors and provides a consistency check on the assumptions regarding the size of the supply shock, private stock changes and consumer behavior.

First, the net availability of rice in the base period (November, 1996 to April, 1997) is calculated as the sum of net production (assuming 10 percent seed, feed and wastage), net market injections by the government (distribution less domestic procurement) and private imports, less private stock changes.¹¹ Changes in per capita demand are calculated using the percentage changes in real rice prices and the own-price elasticity of rice demand. These demand calculations use the estimated consumption (net availability) of rice in the post-aman (November to April) season of 1996/97 as a base. The model then calculates the equilibrium price of rice that equates domestic supply and demand in the absence of private sector imports. If this price is below the import parity price, then this price represents the market price of rice in Bangladesh. If, however, the equilibrium price is above the import parity price, the model uses the import parity price to recalculate demand. In this case, imports are then determined as the difference between domestic supply and demand.

Table 5.1 presents the base 1996/97 data and the results of several simulations involving alternative assumptions for the size of the aman harvest. Total availability of rice in the 1996/97 aman season was 8.051 million metric tons. The first simulation assumes the same private change in stocks in 1997/98 as in 1996/97, and the original government distribution plan for 1997/98, (as of September 1997). Setting aman production equal to the target level of 9.74 million metric tons, net availability (in the

¹¹ Stock changes are estimated to be 800,000 metric tons, equivalent to the sum of aman harvest period production and imports, less six months consumption.

Table 5.1 — Estimates of the Size of the 1997/98 Aman Shortfall

	1996/97	1997/98	1997/98	1997/98	1997/98
	Actual	Target	Official Prod	Low Prod	Low Prod
	Production	Production	High Stocks	High Stocks	Low Stocks
Production	9.550	8.850	8.850	8.200	8.000
Losses, seed, etc. (10 percent)	0.955	0.885	0.885	0.820	0.800
Net Production	8.595	7.965	7.965	7.380	7.200
Domestic Procurement (Nov-Apr)	0.201	0.039	0.039	0.039	0.039
Offtake from Government Stocks	0.438	0.334	0.334	0.334	0.334
Private imports	0.019	0.000			
Private stock change	0.800	0.800	0.800	0.800	0.600
Supply	8.851	8.260	8.260	7.675	7.495
Supply less private stock change	8.051	7.460	7.460	6.875	6.895
Demand	8.051	7.460	7.829	7.829	7.829
Imports (calculated)			0.370	0.955	0.935
Change in production (percent)		-7.330	-7.330	-14.136	-16.230
Change in net production (MT)		-0.630	-0.630	-1.215	-1.395
Change in demand (MT)		-0.591	-0.222	-0.222	-0.222
Change in demand (percent)		-7.347	-2.757	-2.757	-2.757
Change in per capita demand (percent)		-9.164	-4.664	-4.664	-4.664
Change in real price (percent)		61.697	26.972	26.972	26.972
Price elasticity of demand		-0.200	-0.200	-0.200	-0.200

Note: Figures in million metric tons unless otherwise indicated.

Source: Author's calculations.

absence of private sector imports) is 8.173 million metric tons, an increase of 1.52 percent relative to 1996/97. In per capita terms, however, total availability is 0.47 percent less than in the previous year. Assuming an elasticity of demand of -0.20 , average prices for the season thus rise by 2.4 percent in real terms.

Average nominal prices are only 10.4 Tk/kg (wholesale, Dhaka), 19 percent below import parity, so no rice is imported.

The second simulation estimates the size of private sector imports with aman production equal to 8.85 million metric tons, (the final official estimate). Actual net market injections by the government for the November 1997 to April 1998 period were 295,000 metric tons of rice. Assuming the same change in private stocks during the post-aman season in 1998 as in 1997, (800,000 metric tons), domestic supply (including government market injections) would be only 7.460 million metric tons. With no private sector imports, domestic prices would rise to 16.4 Tk/kg, 27 percent above the import parity price. But given free trade, prices rise only to import parity, 12.9 Tk/kg, and private sector imports are 341,000 MTs. Actual private sector imports during this period were approximately 950,000 MTs, (760,000 MTs through official channels and an estimated 200,000 MTs through informal trade). The simulation thus suggests that production was less than the official estimate.

With an own-price elasticity of demand for rice of -0.2 and the same change in private stocks as in 1997, 950,000 MTs of imports imply that production was only 8.2 million MTs. The change in private stocks for the 1998 post-aman period is likely to have been smaller than in 1997. Assuming the change in private stocks was only 600,000 MTs, 950,000 MTs of private sector imports would imply that aman production was only 8.0 million MTs.¹²

¹² Note that demand for rice is equal to 7.829 mn MTs in each of the last three simulations shown in Table 5.1. This is because in each simulation, the market price is the import parity price.

Table 5.2 — Aman 11997/98 Aman Shortfall and Imports - Sensitivity Analysis

Own-Price Elasticity of Demand = -0.2

Production	Change in Private Stocks	Private Sector Imports
8.85	0.80	0.34
8.50	0.80	0.68
8.20	0.80	0.95
8.00	0.60	0.93

Own-Price Elasticity of Demand = -0.1

Production	Change in Private Stocks	Private Sector Imports
8.85	0.80	0.56
8.50	0.80	0.87
8.40	0.80	0.96
8.20	0.60	0.94

Own-Price Elasticity of Demand = 0.0

Production	Change in Private Stocks	Private Sector Imports
8.85	0.80	0.75
8.60	0.80	0.98
8.50	0.80	1.07
8.50	0.60	0.87
8.40	0.60	0.96

Note: Figures in bold denote estimates consistent with observed private sector rice imports.

Source: Author's calculations.

Table 5.2 shows results of sensitivity analysis with respect to various assumptions of production levels, changes in stock and the own-price elasticity of demand for rice. Figures in bold denote simulations which result in private sector imports consistent with observed levels in 1997/98 (approximately 950,000 MT). With a more inelastic demand, (an own-price elasticity of demand for rice closer to zero), at import parity prices rice demand falls less than in the simulations of Table 5.1. Thus, observed import levels are consistent with higher production figures. Given private stock changes of 600,000 MT, 950,000 metric tons of imports are consistent with production of 8.0, 8.2 or 8.4 million MT for own-price elasticities of demand of -0.2 , -0.1 or zero, respectively. Assuming that the elasticity of demand is between -0.1 and -0.2 , and that private stock changes were between 600 and 800 thousand MT, then production of aman rice was between 8.0 and 8.4 million metric tons.

Three important points are illustrated by this analysis. First, the large volume of imports in recent months suggests that the aman production shortfall was even greater than given in official estimates. Second, imports do not completely replace lost production. With the rise in rice prices, consumers consume less: 2.4 to 4.6 percent less per capita than in 1996/97 under the two scenarios described above. Finally, government market interventions have contributed relatively little to market supply. Net government market injections are only about one-third the size of private imports (2.95 lakh tons compared to approximately 9.5 lakh tons). And in the January to April 1998 period, net market injections were only about one-fourth the size of private imports. Thus, the flow of private imports has been the dominant factor in stabilizing domestic market supply and prices after the 1997/98 aman shortfall.

6. CONCLUSIONS

The main message of this paper is that food policy in Bangladesh should take into account of the potential impacts of India's policies and cross-border trade. Liberalization of rice imports by Bangladesh in early 1994, combined with liberalization of rice exports by India later in the same year, have enhanced Bangladesh food security by providing a ceiling on the market price of rice in Bangladesh. In two recent periods, December, 1994 to May, 1996 and December, 1997 through early 1999, private sector rice imports from India have helped to stabilize market supplies, benefiting consumers of rice and saving the Government of Bangladesh the purchase and distribution costs of importing rice.

Thus, more effort should be made in monitoring India's food policy, production forecasts, and current market conditions. Much of this could be done simply by timely collection of information published by the Government of India. In addition, information-gathering efforts undertaken in the analysis of the rice market situation following the 1997/98 aman shortfall could be done on a regular basis. First, letters of credit for rice trade could be regularly obtained in order to monitor future rice imports. Second, data on actual official trade flows should be obtained and regularly checked against the letter of credit data. Third, currently on-going small surveys of market flows and prices at major cross-border trade points could be done on a more regular basis.

Further research is needed to more fully explore the important linkages between the foodgrain markets of India and Bangladesh. A first step would be to conduct a survey of rice importers in Bangladesh to learn more about rice import contracts, time lags, how trading information is obtained, and the specific origin of rice imports. Second, a study of the behavior of rice and wheat markets in India could be done, involving a review of the Indian literature and a detailed description of market flows and actors, government policy,

and international trade. Third, formal modeling of the interactions between the foodgrain markets in India and Bangladesh could be undertaken to help quantify these linkages.

Finally, the government's role in encouraging large-scale rice imports by the private sector in early 1998 emphasizes the importance of a transparent food policy in stabilizing foodgrain markets. The Bangladesh government provided clear signals to the private markets by reducing the import surcharge on rice; it also maintained incentives for private sector rice imports by limiting OMS subsidized sales and by not interfering with private sector trade. These policies were instrumental in the successful management of the 1997/98 aman shortfall and the 1998 flood. Maintaining a transparent and consistent food policy in this way can thus add to Bangladesh food security, as well as reduce fiscal costs to the government.

REFERENCES

- Agarwal A.N. and Hari Om Varma (1997): "Indian Economy - Statistical yearbook 1997" ; National Publishing House 1997.
- Ahmed and Hossain (1990): "Development Impact of Rural Infrastructure in Bangladesh" : Research Report 83, IFPRI, Washington D.C. U.S.A.
- Ahmed and Shams (1994): "Demand Elasticities in Rural Bangladesh : An Application of the AIDS model"; The Bangladesh Development Studies, Vol. XXII, March 1994, Number 1.
- Ahmed, Akhter U. (Forthcoming): "Trends in Consumption, Nutrition and Poverty"; Coming Out of The Shadow of Famine : Evolving Food Markets and Food Policy in Bangladesh. International Food Policy Research Institute, Washington D.C..
- Ahmed, Raisuddin and Andrew Bernard (1989): "Rice Price Fluctuations and an Approach to Price Stabilization in Bangladesh"; Research report 72, Washington, DC: International Food Policy Research Institute.
- Alamgir, Mohiuddin and Lodewijk J. J. B. Berlage (1973): "Foodgrain (Rice and wheat) Demand, Import and Price Policy for Bangladesh" ; The Bangladesh Economic Review, 1973, Vol. I, No. 1, January 1973.
- Baulch, Bob, Jayanta Das, W.M.H. Jaim, Naser Farid and Sajjad Zohir (1998): "The Spatial Integration and Pricing Efficiency of The Private Sector Grain Trade in Bangladesh : Phase I and II Report. Published by : Bangladesh Institute of Development Studies, Bangladesh Agricultural University, University of Sussex.
- Bouis, H.E. (1989): "Prospects of rice supply/demand balances in Asia" ; IFPRI, Washington, D.C. Mimeo, 1989.
- Bouis, Howarth E. and Lawrence J. Haddad (1992): "Are Estimates of Calorie-income Elasticities too High?" ; Journal of Development Economics 39 , 1992 ; page 333-364. North-Holland.
- Chowdhury, Nuimuddin(1992): "A Reassessment of Poverty Record : A Further Comment on Osmani" ; The Bangladesh Development Studies, Vol. XXI, No. 1.
- Chowdhury, Nuimuddin(1993): "A Reassessment of Poverty Record : A further Comment on Osmani"; The Bangladesh Development Studies, Vol. XXI, No.1.
- CMIE (1998): "Monthly Review of the Indian Economy" various issues in 1998. Center For Monitoring Indian Economy Pvt. Ltd.
- Deb, Narayan Chandra (1986): "Consumption Pattern in Rural Bangladesh" ; The Bangladesh Development Studies 14, 1986 ; page 1-28.
- Goletti, Francesco (1993): "Food Consumption Parameters in Bangladesh"; International Food Policy Research Institute (IFPRI), Bangladesh Food Policy Project. April 1993.

- Government of India (1997): "Economic Survey 1996-97"; Government of India, Ministry of Finance, Economic Division.
- Government of India (1998): "Indian Economic Survey 1997-98"; a pre-budget 1998-99 document : as presented in the August House, The Lok Sabha by The Hon'ble Finance Minister Shri Yashwant Sinha. Published : June 1998.
- Hamid, Mohammad Abdul, Ph.D (1991): A Data Base on Agriculture and Food grains in Bangladesh (1947-1990) ; August, 1991.
- Mitchell, Donald (1998): "Annex1: Rice Production Data – What Can We Believe?". World Bank (mimeo), June 15, 1998.
- Osmani, S.R. (1990): "Structural Change and Poverty in Bangladesh"; The Bangladesh Development Studies; Vol. XVII, No.3.
- Osmani, S.R. (1993): "Reassessment of Poverty Record : A Rejoinder"; The Bangladesh Development Studies. Vol. XXI, No. 1.
- Radhakrishna, R. and K. Subbarao (1997): "India's Public Distribution System: A National and International Perspective"; World Bank discussion paper no: 380. The World Bank, 1997.
- Rahman, Mahfoozur, et.al. (1994): "Cross-Border Trade and Commodity Prices of Principal Food Items"; Washington, D.C. : International Food Policy Research Institute, Bangladesh Food Policy Project (unpublished project report).
- Rahman, Mahfoozur (1998): "Turning the Full Circle: Rationale and Mechanics of Rice Exports from Bangladesh"; Draft Working Paper, FMRSP, June 1998.
- Shahabuddin, Quazi (1992): "A Disaggregated Model for Stabilization of Rice Prices in Bangladesh"; The Bangladesh Development Studies. Vol. XX, March 1992, No. 1.
- Shahabuddin, Quazi and Paul Dorosh (1998): "Rice Markets in the 1997-98 Aman Season :A rapid Appraisal Analysis"; FMRSP Working Paper No. 1; February 1999.
- Shahabuddin, Quazi and Sajjad Zohir (1995): "Medium and Long Term Projections of Foodgrain Demand, Supply and Trade Balance in Bangladesh" ; The Bangladesh Development Studies. Vol. XXIII, Sept.-Dec. 1995, Nos. 3 &4.
- Talukdar R.K (1990): "Food Consumption Parameters in Bangladesh – Implications for Food Policy". Bangladesh Journal of Agricultural Economics, Vol. XIII, 1 and 2 , December 1990.
- World Bank (1992): World Bank, Bangladesh Food Policy Review: Adjusting to Green Revolution, Washington, D.C.

FMRSP Bangladesh

Food Management & Research Support Project
Ministry of Food, Government of the People's Republic of Bangladesh



The FMRSP is a 3.5 year Project of the Ministry of Food, Government of the People's Republic of Bangladesh, providing advisory services, training and research, related to food policy. The FMRSP is funded by the USAID and is being implemented by the International Food Policy Research Institute (IFPRI) in collaboration with the Food Planning and Monitoring Unit (FPMU) of the Ministry of Food, the Bangladesh Institute of Development Studies (BIDS), the University of Minnesota and International Science & Technology Institute (ISTI).

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